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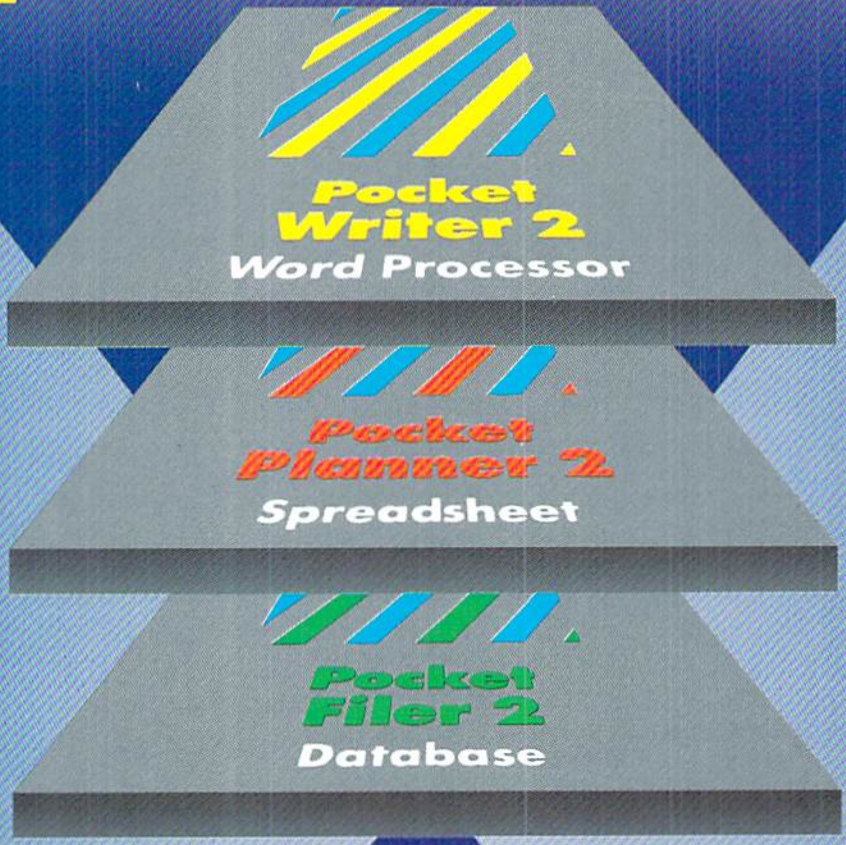
# Ahoy!

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THE COMMODORE USERS Ahoy! Access

# Clipper

MAY 1987

Ahoy! *Readers:*

*This month marks the beginning of spring. It's time to review your system and add to it. And this month, we have lots of good offers to tempt you.*

*This month, you can save big bucks with your purchase of the Star NX-10 Printer from* **Lyco** *or save $10 on* Super Pascal *from* **Abacus**. *If you're ready to win some money at the track, be sure to order* **Alsoft***'s terrific* Race Analysis System, *which is available this issue on a 2 for 1 offer. Want a free disk notcher? Check out the offer from* **American International Computer Products (AICP)**. *Want to learn about the exciting new field of robotics? Order the* Robotics Workshop *from* **Access Systems**. *And with* Operation Terminal, *you can now play a modem game without paying a service fee or accessing a mainframe. This month, you can save a whopping 25% on* Operation Terminal *from* **Dreamrider**. *Enjoy the savings!*

*Happy spring!*

*Admirally yours,*

Joe Ferguson

*Joe Ferguson*
*Director*
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## SAVE 10% ON ANY ACCESS PRODUCT...

Access Systems, as you probably know, makes some very interesting programs, including *Leader Board,* a nifty pro golf simulator, *10th Frame,* a professional bowling simulator, and their latest and greatest product, the *Robotics Workshop.* My sons are more fortunate than I was, because they are learning robotics with the *Robotics Workshop.* The *Robotics Workshop* from **Access Systems** is a computer-age version of the Erector Set I always wanted as a kid. They have had a fantastic time with this fabulous, space-age learning tool. With hundreds of projects and experiments, the *Robotics Workshop* shows how computers and other devices interact in the real world. Whether you're a beginner dabbling in robotics or an enthusiastic hobbyist, you'll appreciate seeing how this fascinating new field will be interacting with your life in the future. Demonstrating computer-controlled, electro-mechanical operation through experiments with hardware and software, each unit of the *Robotics Workshop* contains the computer interface to connect to your home or personal computer. Also included with the *Workshop* are all motors, sensors, snap-together mechanical parts, software, complete project experiment instructions, and a 136-page spiral- bound manual. For more information on the *Robotics Workshop*, look for **Access Systems** ad in this month's issue of *Ahoy!*

And now, until June 1st, 1987, you may purchase the *Robotics Workshop* or any of the other excellent programs from **Access Systems** for 10% OFF, when you order directly from them. You may order by phone with your VISA or MasterCard, by calling (801) 298-9077, and mentioning that you saw this offer in the *Ahoy! Access Clipper.* (Please do not call their 800 number to order!) Or, you may use the handy coupon on page 3 of this *Clipper.* But don't wait, because this offer disconnects on June 1, 1987.

## SUBSTANTIAL SAVINGS ON THE STAR NX-10 FROM LYCO...

In each issue of *Ahoy!*, you'll find two pages of great computer offerings from **Lyco Computer.** Because **Lyco** knows that if you try 'em, you'll like 'em, they're extending the following excellent offer: When you buy the Star NX-10 Printer with the Printer Stand at $19.95, the printer, which normally sells for $215 is available to you for only $175. For more details on shipping and handling, check out **Lyco**'s ad in this month's issue of *Ahoy!* Order your Star NX-10 Printer and Printer Stand by clipping the **Lyco** coupon on page 3 of this *Clipper.* For more information on printers and interfaces, you may call them at 1-800-233-8760; in Pennsylvania, call 1-717-494-1030. They will accept phone orders on this offer, but you must mention your membership in the Club. This offer expires on June 1, 1987, so hurry and complete the **Lyco** coupon right away!

## FREE SOFTWARE WITH $10 PURCHASE FROM S & S...

**S & S Wholesalers** has very good prices, some of the best you'll find anywhere on Commodore and Commodore-compatible hardware and software. They're anxious for you to consider buying from them when you're in the market, so they're making you this exciting offer: When you clip the **S & S** coupon on page 3 of this *Clipper* and send it along with your order of at least $10, you'll receive 1 FREE piece of software! It's **S & S**'s way of motivating you to consider their good prices and excellent service. See their ad in this month's issue of *Ahoy!* If you're in a hurry, you may call them at (800) 233-6345, or in Florida, call (305) 538-1364. But be sure to mention that you saw this offer in the *Ahoy! Access Clipper*, so that you receive your FREE SOFTWARE. This offer expires on June 1, 1987, so mail your order RIGHT AWAY!

## PAY FOR FOUR MONTHS, GET A FREE MODEM FROM QUANTUMLINK...

**QuantumLink** is one of the better subscriber services for features like online games, live conferences, software reviews, and user group support. Their advertisement in this month's issue of *Ahoy!* will tell you how you may receive a FREE **QUANTUMLINK** MEMBERSHIP KIT, when you subscribe to *Ahoy!* (Since you're probably already a subscriber, you may take advantage of this offer by extending your subscription.) For *Ahoy!* Access Club members, **QuantumLink** is making an additional offer: Get FREE **QuantumLink** software, plus a FREE 300-baud, auto-dial modem by paying for four months of **QuantumLink** Basic Service ($9.95/month) at $39.80. You may order by clipping the **QuantumLink** coupon on page 3 of this *Clipper*, or by calling them at 1-800-392- 8200, and asking for Department 25. This offer expires August 31, 1987, so mail or phone your order TODAY!

## MORE SAVINGS FROM ABACUS...

**Abacus Software**, one of the leading marketers of Commodore-compatible software, has recently added a new C-128 version of *Super Pascal* to their wide selection. *Super Pascal* provides a complete system for developing applications in *Pascal.* While it offers a standard Jensen & Wirth compiler, *Super Pascal* also has an extensive editor, as well as a graphics library. If you're ready to expand your programming horizons to include the second most popular language, *Super Pascal* from **Abacus** is one of the best tools available. The new features added for the 128 version are a RAM disk, 100K sourcing one drive or 250K when sourcing two. It also offers the option of working in 40 or 80 column format.

This month **Abacus** is continuing their generous coupon offer. The **Abacus** coupon on page 3 of this *Clipper* is redeemable for $5 OFF the purchases of any book and/or $10 OFF the purchase of *Super Pascal*, purchased directly from **Abacus.** (This coupon is not good for optional diskettes with books.) You must redeem this coupon through the mail, but don't wait, because this coupon is invalid after June 1, 1987.

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## 25% OFF THE FIRST EVER AND OUR HUMBLE APOLOGIES...

In the last *Clipper,* we featured an offer on **Dreamrider**'s *Operation Terminal,* the first modem game you can play without paying a service charge or accessing a mainframe. **Dreamrider**'s *Operation Terminal* is a full-color, person-to-person search game. With *Operation Terminal,* you'll enter a world of fast action and espionage, as you search the mysterious Antimatter complex for top secret documents. It's a game of strategy that's challenging, yet easy to play. To play with a friend, all you need is to have a modem, buy *Operation Terminal* and link up with a friend who also has a modem and the game. As an introduction to this innovative concept, **Dreamrider** is offering a generous 25% DISCOUNT off the regular price of $39.95, so you'll pay only $29.95 for this groundbreaking software. Simply clip the **Dreamrider** coupon on page 3 of this *Clipper,* and send it along with your payment. You will need to add $2.50 for shipping and handling. But don't wait to order, 'cause this offer unlinks on June 1, 1987. (Our humble apologies are due, because a production error in the March *Clipper* indicated that the offer expired February 1. Sorry!)

*The* Ahoy! Access Clipper *is published bimonthly by* Ahoy! *magazine and sent free to selected subscribers of* Ahoy! Ahoy! *is a monthly publication of Ion International Inc. The cost of a one-year subscription is $23.00; two years are $44.00. Inquiries regarding subscriptions to the magazine should be addressed to Ion International Inc., 45 West 34th Street, Suite 407, New York, New York 10001.*

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# Ahoy!

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*Includes program: HELPKEY (for the C-128)

### PROGRAMS



**Cover art by James Regan and Tony Mascio; photos by Michael R. Davila and Morton Kevelson**




ISSUE NO. 41 MAY 1987

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# VIEW FROM THE BRIDGE

You've got to watch a guy like Buck Childress. He started about a year and a half ago, selling us an occasional utility program. Soon he was placing one in every issue. Before much longer, he had two per issue as often as not. Just as the beads of sweat had begun to proliferate on Dale Rupert's and Morton Kevelson's foreheads, last month rolled around and... nothing from Buck.

And then a couple of weeks ago, during a New York jaunt, Buck dropped by our office to tell us the reason for the long silence...and to hand deliver his revisions of our *Bug Repellent* proofreaders for the C-64 and C-128!

In addition to reporting on your keypunching correctness or lack thereof immediately upon entering each line, the new *Bug Repellents* incorporate a handy and optional automatic save feature. We're sure these improved programs will make entering *Ahoy!* listings a much more agreeable task. Please note that you must type in and use these new *Bug Repellents* to proofread the programs in this issue. And please take special note the next time you see an issue of *Ahoy!* without a Buck Childress program. We're liable to appear the following month under a different title!

As for this month's issue of what we hope will still be *Ahoy!* by the time it reaches you:

• Because we only began reviewing Amiga software in February, long after the release of *DeluxePaint*, we had to give it the brush. But the coming of *DeluxePaint II* has given Morton Kevelson the opportunity to devote well-deserved space to the undisputed champion of Amiga software. (Turn to page 53.)

• Aspiring cat burglars are advised to put in lots of practice with Tony Brantner's *Wall Crawler*. Falling flower pots and closing windows are much more dangerous 20 stories up! (Turn to page 34.)

• Richard Herring continues to make discoveries about the COMAL programming language that we're certain will surprise even its devoted Users Group! This month, Richard finds *Microworlds in COMAL.* (Turn to page 50.)

• Managing Editor Mike Davila's first *Ahoy!* program (with the help of Michael Kress and Paul Maiorello), *Startup* lets the C-128 user place autobootable programs on disk and safeguard them from otherwise certain destruction due to a flaw in the 128's validation procedure. (Turn to page 38.)

• Another of those all-too-rare games that allow two contestants to be onscreen simultaneously, *Scavenger Hunt* will not disappoint fans of Bob Blackmer's imaginative programming efforts. (Turn to page 63.)

• We've seen (and published) a lot of space battles, but remain suckers for a good one. James C. Hilty provided us with one of very high pedigree in this issue's *Moondog.* (Turn to page 30.)

• Because we know you graphics programmers can never get too much control over the 64's hi-res screen, *Graphic Wedge* supplies 11 new commands. (Turn to page 29.)

• For things like your records of arms deals with Iran, *Illusion Master* makes it possible to remove the name of any file from your disk directory, or the entire directory if you wish. (Turn to page 36.)

• Our *Entertainment Software Section* includes a feature on multiplayer strategy games, and a behind-the-screens look at the creation of a computer game. As well, we've reviewed three releases of special interest to the martial-minded: *Desert Fox, Ogre,* and *Iwo Jima 1945/Falklands 82.* (Turn to page 41.)

Also inside: our *Art Gallery* of reader-rendered computer art (turn to page 32); *Reviews* of *Cyber Video, Tax Master,* and the *Sixth Sense 128* terminal software program (turn to page 64); *Scuttlebutt* about upcoming releases for the 64, 128, and Amiga; and much more.

You'll have to excuse us. Buck Childress just popped in again. He's running a tape measure across the bottoms of our desks. We're going to get a gun. *—David Allikas*

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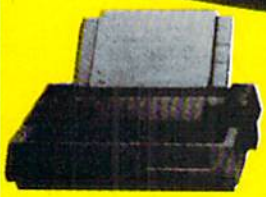
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### GAMES

First releases in two new C-64 software lines by Epyx:

The first of a planned Masters Collection of simulations and adventures for advanced players, *Sub Battle Simulator* lets players command one of six classes of US Navy subs or German Kreigsmarine U-Boats. Over 60 different historically based missions can be played, or the entire war if you prefer.

*Street Sports Basketball* attempts, like other planned titles in the Street Sports line, to recreate the special flavor of playground pickup games. Players select their three-person teams from a pool of 10 individuals with varied strengths and weaknesses, and their court from among four neighborhood scenes.

Epyx, Inc., 415-366-0606 (see address list, page 106).

Three C-64 games from Data East, each $34.95:

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To succeed as an *Express Raider* you must fight your way from car to car of the Gold City Express to rescue passengers and loot held captive by bandits.

Two players team up as *Ikari Warriors*, fighting their way through rivers, jungles, and entrenchments in enemy territory. You'll have machine guns, grenades, rocket launchers, and a tank to help you.

Data East USA, Inc., 408-286-7074 (see address list, page 106).

Two for the 64 from Accolade:

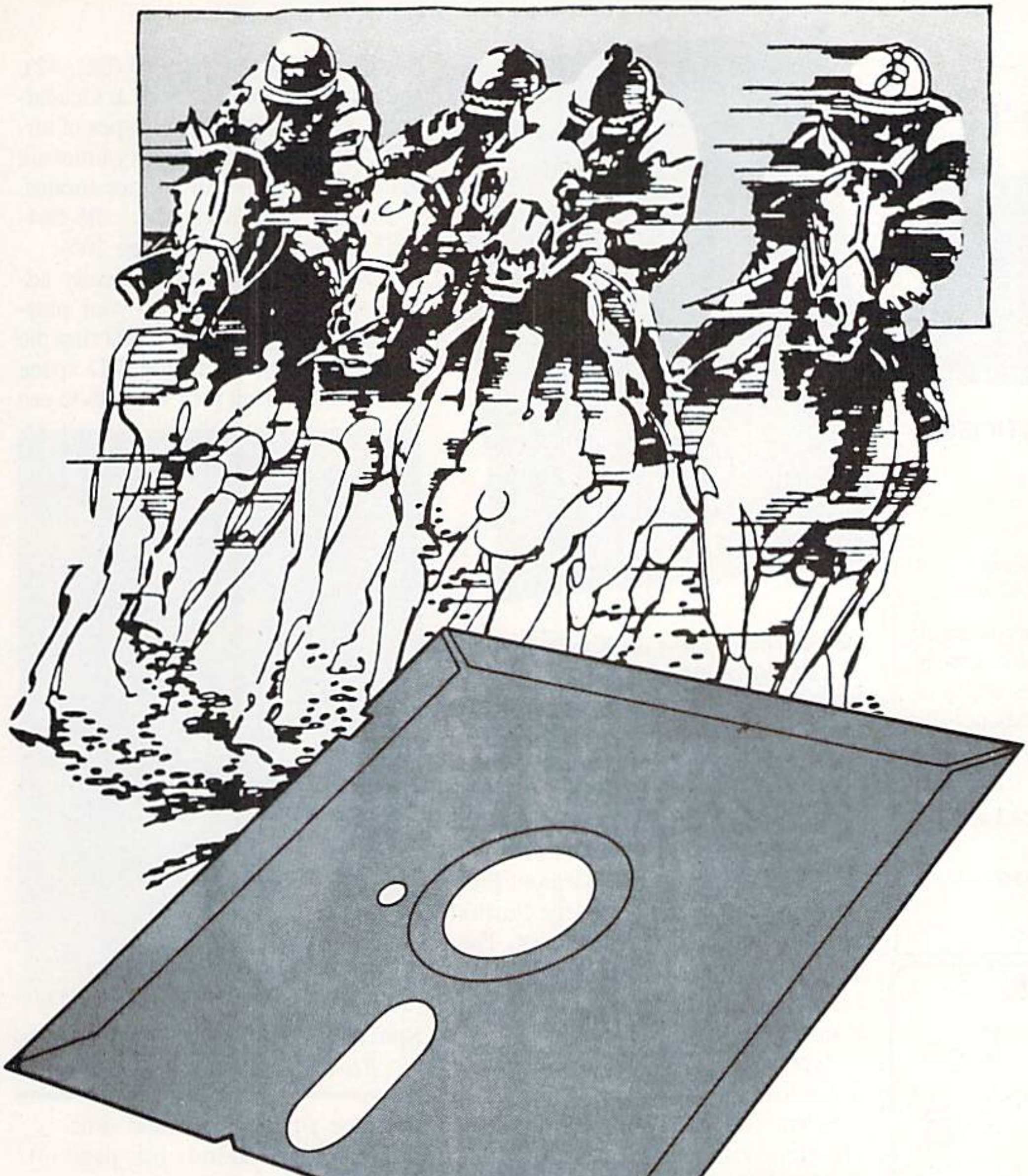
*Accolade's Comics* ($39.95) allows the user to read an onscreen comic book and determine the story's direction by continually answering questions asked of the main character. Arcade-like games pop up when that character, super spy Steve Keene, falls into traps and other dangerous situations. The two main storylines involve locat-




*Featuring two themes, dozens of major and minor storylines, and eight arcadelike games,* Accolade's Comics *stars Steve Keene, who attempts to foil evil plots for the Chief of Spystuff, Inc. READER SERVICE NO. 212*




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**Denethenor:** ***based on Nordic legend.***
***READER SERVICE NO. 208***

ing a kidnapped Nobel Prize winner and foiling a parking garage tycoon causing fire hydrants to reproduce.

Released under Accolade's mid-priced Avantage line, *Power* ($14.95) pits the player against the Demoid Empire, attempting to occupy the Earth's vial Mitonium conversion plant. The trick is to infiltrate the occupied asteroid and disable the converter before the aliens destroy it.

Accolade, 408-446-5757 (see address list, page 13).

Sierra On-Line's first fantasy role-playing adventure since releasing *Ultima I* and *II* more than five years ago, *Wrath of Denethenor* ($19.95) is based on a Nordic legend about a price who sells his soul to the devil. The player can try on the persona of a sorcerer, thief, and fighter in the same game.

Sierra On-Line, Inc., 209-683-6858 (see address list, page 13).

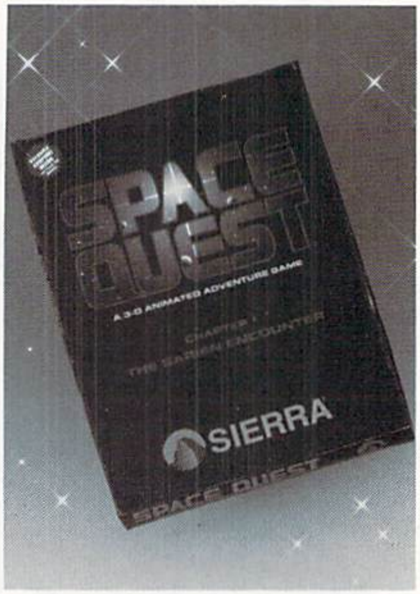
Additionally, Sierra has adapted several of its existing titles to the Amiga, all to be distributed under Electronic Arts' Affiliated Labels program. Scheduled to appear before the end of spring are *King's Quest I, II,* and *III, Donald Duck's Playground, Winnie the Pooh in The Hundred Acre Woods,* the adult-theme *Police Quest,* and the *Space Quest 3-D Animated Adventure.*

Electronic Arts, 415-571-7171 (see address list, page 13).

*War in the South Pacific* ($59.95) offers strategic wargamers a choice of three battles: Coral Sea (May '42), marine invasion of Guadalcanal (Oct. '42), and Japanese counterattack at Guadalcanal. Over 400 ships, 17 types of aircraft, and numerous infantry units are managed in 1-, 4-, or 8-hour modes.

Strategic Simulations Inc., 415-964-1353 (see address list, page 106).

*Tracker* ($39.95) automatically adjusts its difficulty level to your playing ability, as well as remembering the tactics you employ in the 3-D space battle and blocking your attempts to use




**Space Quest:** ***science fiction parody.***
***READER SERVICE NO. 209***

the same strategy a second time.

Firebird (see address list, page 13).

## COFFIN AND CAKE

*Make Your Own Murder Party* ($39.95) allows C-64 owners to host their own evening of dinner and amateur sleuthing. First a scenario is chosen from the two provided: The Big Kill, reuniting a group of 60's college friends to reminisce and discover which one of them is a murderer, and Empire, requiring members of a rich and powerful family to determine who murdered the group's matriarch. Guests are then matched with character roles, which the host can personalize with individual characteristics of his guests. The computer then prints invitations, clue sheets, capsule biographies, and background information for each guest, after which it is no longer required for game play. The computer changes the murderer's identity each time a new party is thrown.

Electronic Arts, 415-571-7991 (see address list, page 13).

**OFFLINE ONLINE SERVICE**

An attempt to provide the services of a BBS on a monthly basis, the *Spectrum Electronic Network* offers 16 different Special Interest Group (SIG) boards devoted to such topics as news for C-64 users, technical help, freeware trading, electronic mail exchange, and psychic and metaphysical topics. Subscribers receive a disk once a month and can then post bulletins or respond to mail at their leisure. A one-time fee of $14.95 buys the operating system software and support utilities, along with a two-month subscription. Thereafter, a monthly fee of $6.00 allows unlimited access and private messaging. There are no long distance or other access charges.

Spectrum 1 Network, 213-897-2060 (see address list, page 13).

**TEST-MAKING SOFTWARE**

*Mr. Quizzer* ($19.95) allows parents or teachers to test students on general facts, spelling, math, or any subject on which the user supplies the questions and answers. Options are available for multiple choice, vocabulary, and general question and answer formats. For the 64 or the 128 in 128 mode.

Free Spirit Software, Inc., 312-352-7323 (see address list, page 106).

*Word Search Puzzles* permits teachers to enter word lists, then use them to create word search puzzles. Choices include which words to use, the number to be hidden, the number of rows and columns in the puzzle, and the direction in which the words will appear. Creations can be saved for future use. For the 64; $29.95 (with backup, $44.95).

Gamco Industries, Inc., 800-351-1404; in TX call collect 915-267-6327 (see address list, page 13).

**THEY'RE IN THE MONEY**

As expected, Commodore's strong Christmas season sales of 128s, 64s, and 64C's enabled them to ring up their third profitable quarter in a row. Net income for the quarter ended December 31 was $21.8 million on sales of $270.8 million. In the same quarter one year before, Commodore lost $53.2 million on sales of $339.2 million—but then we never claimed to understand the world of high finance. Other relevant statistics: Commodore ended the quarter with their highest cash position since the March quarter of 1983; bank debt during the quarter was reduced by over $20 million; and revenues for the entire calendar year 1986 were 5% higher than for 1985.

Commodore International Ltd., 215-431-9100 (see address list, page 13).

**NEW AMIGADOS AID**

*AmigaDOS Express: The Online AmigaDOS Manual* ($29.95) lets the user call up information on commands and features while another program is in memory. The program, based on Bantam's *AmigaDOS Manual,* supplies multipage descriptions of each command, including its format and typical usage, plus examples and cross references. Also provided are descriptions of such other aspects of AmigaDOS as devices and error messages.

Concurrently, Bantam has released the second edition of its *AmigaDOS Manual* ($24.95), expanded to include DOS version 1.2 as well as the original 1.1.

Bantam Books, 212-765-6500 (see address list, page 13).

**ONLINE LECTURES**

Connected Education, Inc. offers a variety of college and graduate level courses online, credits from which can be applied toward an MA in Media Studies at the New School for Social Research in New York City, regardless of where the student lives. Due to the late date at which we received the information, the spring '87 semester will be half over by the time you read these words. But there may still be time to register for non-credit interactive lectures on "Film and Culture" (April 6-12) and "Computers in the 1990s" (April 13-19). Fees range from $30 for a weeklong lecture to $858 for a two-month course carrying three graduate credits.

Connected Education, Inc., 212-548-0435 (see address list, page 13).

**LOGO GOES SOLO**

The *LogoWriter* programmable word processor/graphics package, previously available only under a site license

agreement, can now be purchased in single-disk starter sets ($129) and six-disk lab packs ($299) for the C-64. The site license, offering unlimited copying rights for an entire school building, can still be had for $450, but the yearly renewal fee has been waived.

Logo Computer Systems Inc., 800-321-LOGO; in MA 617-742-2990 (see address list, page 13).

## AMIGA VIDEO SYNCHRONIZER

Genlock 1300 ($195), an electronic outboard device, allows Amiga owners to synchronize an external video signal from a VCR, camera, or videodisc player with text, sound, and graphics generated by their computers. This makes it possible to superimpose Amiga-generated graphics, animation, stereo sound, and titles over videotaped images—which previously required much more expensive equipment.

Powered through the Amiga, Genlock connects into the RGB port of the main console. Peripheral controls adjust source hue, position of the video under the Amiga graphics, and balance of audio against the external signal.

Commodore, 215-431-9100 (see address list, page 13).

## "DANGER, SYNTAX ERROR"

Modulus is a Commodore 64 driven personal robot available in three separate modules. The self-propelled Base can follow a programmed itinerary, enabling it to function as a plotter and even, we're told, do light vacuuming. Adding a second module to the base gives you the Security & Service Robot, which can signal the computer or sound an alarm upon detecting the presence of gas, water, smoke, or an intruder, as well as report on the weather. With the third module in place, you have Moddy, with two independently moving robot arms that enable him to retrieve and carry objects.

Sirius S.p.A. (see address list, page 13).

## CONSTITUTION QUIZ

Useful for teachers or for trivia buffs, *Political B.S.* (for Bureaucratic System) asks 2 to 4 players questions based on the U.S. Constitution, in the categories of Political Patter, Constitutional Confusion, Jurisprudent Jargon, and

Which, What, or Who. Each category contains about 250 questions. For the 64; $19.95.

Free Spirit Software, Inc., 312-352-7323 (see address list, page 13).

### PRINT SHOP SCHOOL ART

The latest in Epyx's Graphics Scrapbook series of *Print Shop* and *Print Master* compatible art, *Chapter III: School* ($19.95) includes over 100 graphics for newsletters, posters, banners, and the like, covering topics like band practice, student elections, and cheerleading tryouts.

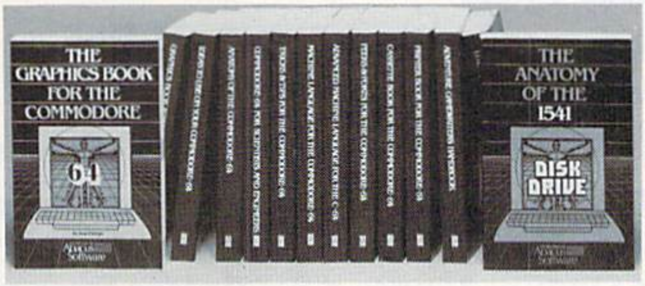
Epyx, Inc., 415-366-0606 (see address list, page 13).

### ABACUS BOOK/DISK OFFER

Until April 30, the optional $14.95 program diskettes of the programs contained in Abacus' books for the Commodore 64 will be included with the books at no additional cost. The offer is good at any of Abacus' more than 2000 retailers. See the photograph on this page for titles available.

Abacus Software, 616-241-5510 (see address list, page 13).

*Continued on page 105*




***Free disks with Abacus books for the Commodore 64. READER SERVICE NO. 210***

### Companies Mentioned in *Scuttlebutt*

**Abacus Software**
P.O. Box 7219
Grand Rapids, MI 49510
Phone: 616-241-5510

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20833 Stevens Creek Bvd.
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**Commodore Int'l**
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**Connected Education**
92 Van Cortlandt Park South
Bronx, NY 10463
Phone: 212-548-0435

**Data East USA, Inc.**
470 Needles Drive
San Jose, CA 95112
Phone: 408-286-7074

**Electronic Arts**
1820 Gateway Drive
San Mateo, CA 94404
Phone: 415-571-7171

**Firebird Licensees**
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Phone: 201-934-7373

**Epyx, Inc.**
600 Galveston Drive
P.O. Box 8020
Redwood City, CA 94063
Phone: 415-366-0606

**Free Spirit Software**
5836 S. Mozart
Chicago, IL 60629
Phone: 312-476-3640

**Gamco Industries, Inc.**
Box 1911
Big Spring, TX 79720
Phone: 800-351-1404 (in TX 915-267-6327)

**Logo Computer Systems**
121 Mount Vernon Street
Boston, MA 02108
Phone: 800-321-LOGO
(in MA 617-742-2990)

**Poseidon Electronics**
103 Waverly Place
New York, NY 10011
Phone: 212-777-9515

**Sierra On-Line, Inc.**
Coarsegold, CA 93614
Phone: 209-683-6858

**Sirius S.p.A.**
Milano Fiori Palazzo F2
20094 Assago (MI)
Italy
Phone: (02) 8245321

**Spectrum 1 Network**
P.O. Box 4903
Panorama City, CA 91412

**Strategic Simulations**
1046 N. Rengstorff Ave.
Mountain View, CA 94043
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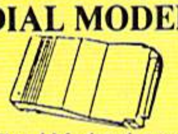
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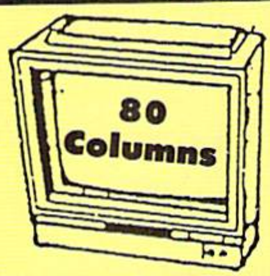
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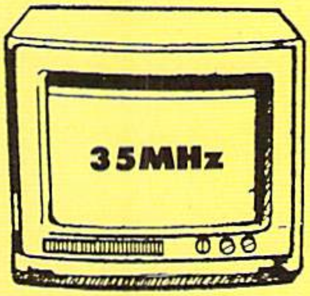



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# Kernal Power

**By Dale Rupert**



**Built into the ROMs of the Commodore computers is a powerhouse of utilities called the Kernal routines. These routines efficiently perform a variety of tasks. They provide high-level functions for the assembly language programmer.**

**Previously we have discussed some of the Kernal routines for the C-64 (*Rupert Report* #16 and #17, *Ahoy!* 4/85 and 5/85). All 39 of the C-64 routines are still available in the C-128, although some of them have been modified slightly. There are 19 new routines documented for the C-128.**

This month we will use some of the new Kernal routines along with some of the old ones to create a handy function key utility for the C-128. If you are not interested in assembly language, the resulting program will still be available to you. We will discuss three ways to create the function key utility: using an assembler, using the monitor, and using BASIC.

## DEFINING THE PROBLEM

BASIC 7.0 on the C-128 provides a very easy way to define the eight programmable function keys (F1 through F8) by means of the KEY command. My boot disk runs a BASIC program upon power-up which defines the eight keys to my liking. For example, the statements

```
KEY 1,CHR$(29) + CHR$(20)

KEY 4,"DLOAD<TAB><TAB><TAB>:" + CHR$(27)
+ "@"

KEY 7,CHR$(27) + "C" + CHR$(27) + "ILIST
" + CHR$(13)

KEY 8,CHR$(27) + "I" + "CLOSE4:OPEN4,4:C
MD4:LIST" + CHR$(13) + "PRINT#4:
CLOSE4" + CHR$(13)
```

are the most exotic of my function key definitions. F1 is a "delete at the cursor" key (unlike the standard "delete to the left of the cursor" key which is also useful). Use it for a while and you will wonder how you managed without it.

F4 is pressed to load an item from the directory. Simply move the cursor to the left of the desired program in the directory listing and press F4. It is purposely a shifted key, and it requires a manual carriage return after it. I want to be sure of my selection before loading any program.

To the standard F7 LIST function I have added an Escape-C, Escape-I sequence. This turns off the Escape-A insert mode (whether it was on or not) and guarantees that the cursor is on its own line before LIST is typed. Most of my function key definitions are preceded by the Escape-I command. Try it, and you'll see why. No more searching for a blank line before pressing a function key.

Finally the F8 key provides a function sorely missed on Commodore computers, the LLIST command. One shifted keystroke sends the current program listing to the printer.

Eight easily programmed function keys are eight more than I had on the C-64 (emphasis on the "easily"). Naturally, even eight are not really enough. Alas, the *Program-*

# Harnessing Those Mighty ROM Routines




*mer's Reference Guide (PRG)* for the C-128 mentions it in the discussion of the Kernal routine PFKEY that there are actually *ten* programmable function keys! The SHIFT/RUN STOP and HELP keys are numbers nine and ten. To redefine them, we will use some assembly language.

The program in this article is a utility to convert the HELP key to a "floating" function key. That means it is a key which is easily and directly defined at any time without bothersome quotation marks or CHR$ functions. The HELP key will be defined with actual keystrokes. Its definition can include carriage returns, escape sequences, and any other keystroke combinations.

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## CONSIDERING THE SOLUTIONS

The requirement that the key be easily definable at any time implies that the program must be "wedged" into the normal computer operation. We don't want to load a program each time the key is to be changed. Three standard areas for wedging are the NMI (non-maskable interrupt) routine, the IRQ (jiffy clock interrupt) routine, and the CHRGET/CHRGOT keyboard interpreter routine.

The NMI routine is executed whenever the RESTORE key is pressed. It could easily be used for our application. The IRQ routine occurs 60 times per second. It should be used only for short routines in which continuous monitoring or updating is required. The *PRG* provides a discussion and examples for using both of these routines.

I decided to use the third alternative, the CHRGET/CHRGOT wedge. It has been discussed in various magazines and books on the C-64 and the C-128. My reference is a very useful volume on the C-128 entitled *COMPUTE!'s 128 Programmer's Guide* (COMPUTE!, 1985).

An advantage of wedging into CHRGET/CHRGOT is that we may choose any keystroke to initiate our function key utility. BASIC calls the CHRGET routine after we have entered text in the direct mode. CHRGET retrieves the characters from the BASIC input buffer and analyzes them. The goal is to have BASIC come to our program before it reaches CHRGET, so that our program can examine the entered keystrokes and intercept the "trigger" key to initiate the HELPKEY utility.

BASIC calls the CHRGET subroutine at RAM address $380 (hexadecimal values are preceded by $). The process of wedging into CHRGET requires that we merely insert instructions at $380 to pay a visit to our program. We will put instructions at address $380 so that when BASIC calls CHRGET, it actually branches to the portion of our program beginning at address $131F. Our program duplicates the instructions of CHRGET to get the first character out of the input buffer. Our program will determine if it is the trigger key character to continue with the HELPKEY program. If not, we'll send the computer back to its normal operation.

I chose the <COMMODORE+English Pound> keystroke as the trigger key to initiate the HELPKEY definition program. If that's one of your favorite keystrokes for some other purpose, it is easily changed. The other keystroke used by the program is the <SHIFT+English Pound>. It is used to abort the redefinition of the HELP key without changing its current definition.

One final consideration is that the HELPKEY program should use Kernal routines whenever possible to simplify and to shorten the program.

The PFKEY routine is the only complicated Kernal routine we will use. Before we call this routine (according to the *PRG* on page 450), the accumulator must contain a zero-page pointer, the X-register must contain the function key number, and the Y-register must contain the length of the string to be assigned to the selected function key.

The zero-page pointer in the accumulator is a one-byte value identifying the zero-page location of a vector. The vector is three bytes long in page zero RAM. It identifies the starting memory address and the bank number where our key-assignment string begins. This makes much more sense with specific values.

We will store the assignment string in RAM starting immediately after the HELPKEY program. It turns out that this storage area begins at address $1396. To access program RAM and Kernal ROM we shall specify bank 15.

All we need now are three consecutive zero-page RAM locations in which to store the vector. Page 509 of the *PRG* lists zero-page addresses $FA through $FE as "Reserved for Application Software." That's us! We will (arbitrarily) use $FB, $FC, and $FD to store the vector.

Consequently to specify address $1396 in bank 15 ($0F) as the start of our key-assignment string, we will put $96 into address $FB, $13 into $FC, and $0F into $FD in typical "low byte/high byte/bank#" format. We will call PFKEY with $FB in the accumulator. $FB points to the zero-page vector. The zero-page vector points to the assignment string location. That is how PFKEY knows where to look for the key-assignment string. (Could it possibly be any more complicated than it already is?)

## THE RESULTS

The HELPKEY program was written using an assembler. Refer to HELPKEY.ASM on page 86 for this discussion.

To define the HELP key, press the trigger key <COMMODORE+English Pound> and press <RETURN>. A starting symbol and a steady cursor are displayed, and the characters you now type are displayed and will be assigned to the HELP key. After the last character is typed, press the terminator key which is also the <COMMODORE+

English Pound>. The HELP key is thereby redefined. To abort the redefinition at any time before the terminator key is pressed, press <SHIFT+English Pound>.

The program is located starting at address $1300. The first part of the assembler listing (lines 4-12) defines the constants used in the program. The WEDGE code at line 14 sets up the CHRGET bank-select and jump instructions.

Beginning at line 14, we put the STA $FF01 and JMP $131F instructions into the CHRGET routine to bring it to the START address of our program. STA $FF01 selects bank 14 so that routines calling CHRGET from anywhere will be able to find our program in RAM 0. The RTS returns control to BASIC. To install our program, we must first load it into memory. Then we must execute a SYS 4864 ($1300) to establish the wedge. Once that is done, our program gets a chance to look at each set of keystrokes entered in the direct mode of BASIC.

The code at START updates the BASIC text pointer, then calls CHRGOT to fetch the first keystroke in the input buffer (just as CHRGET would). The first character from the buffer is now in the accumulator when CHRGOT returns to line 32. Line 32 determines whether or not it is our trigger key <COMMODORE+English Pound>, which has an ASCII value of $A8. If it is not the trigger key, control is transferred to CHRGOT (with a JMP this time) just as if nothing had happened.

Once the trigger key is recognized, the MAIN routine is begun. A flag is checked to see if the computer is in RUN mode or DIRECT mode. Our program will be called only from DIRECT mode. The registers are pushed onto the stack (good programming practice, whether necessary or not) in lines 38-42. The count of characters in the HELP-KEY definition is zeroed, and RAM bank 15 is selected.

(Just as an aside, that apparently innocuous STA CONFIG in line 45 was the culmination of *many* hours of head-scratching and debugging. The program worked fine without it only with the 40-column screen. With the 80-column screen, the characters I typed were never echoed by the Kernal routine BSOUT in line 61. The problem was that CHRGOT leaves bank 14 selected. Storing $00 in the configuration register at $FF00 selects bank 15, and everything works as it should. The keystrokes are now visible on the 80-column screen.)

The rest of the program is fairly straightforward. The Kernal routine GETIN is in a loop which repeatedly checks the keyboard buffer until a character is found. (It is comparable to the BASIC GET command. Just like the GET command, it does not generate a cursor, unfortunately.) The PRIMM Kernal routine is used in lines 46 and 59 to create the cursor. (We will discuss PRIMM's operation shortly.)

The cursor character $A4 and a <cursor-left> $9D are printed. If a key is pressed and if that character is the <COMMODORE+English Pound> terminator, the program branches to DONE. If the character is the <SHIFT+English Pound> abort key, the program branches to QUIT. Before the branch to QUIT, the carry flag is set in line 53. The QUIT routine tests this flag to know whether the key definition was successfully completed.

Any other character causes execution to continue at line 55. The current count of stored characters is retrieved in the Y register. Y is used as an index for storing the current character. Y is incremented and that count value is saved. PRIMM is called to blank the cursor by printing a <space> $20 and a <CURSOR LEFT>. Finally the Kernal routine BSOUT is called to display the character which is still in the accumulator, and the loop is repeated. BSOUT is comparable to the BASIC PRINT command for one character at a time.

When the terminator key is found, the program branches to DONE. There the zero-page vector, the accumulator, X-register, and Y-register are loaded in preparation for the call to PFKEY. PFKEY assigns the string to the HELP key. At QUIT, the registers are restored from the stack.

At line 79, the carry flag is tested. If the carry flag is reset (cleared), the key definition by PFKEY was successful and the program jumps to CHRGOT to resume normal operation. If PFKEY was not able to redefine the HELP key, it returns with the carry flag set. Likewise if the abort key was detected earlier, the carry flag is still set. In either case, the code starting at ERR is executed.

Here another new Kernal routine PRIMM is called. This is a handy "print immediate" routine. The program must JSR to PRIMM. Immediately following JSR PRIMM is a string of characters terminated by one byte of $00. These characters (BELL, carriage return, "ABORT", carriage return) are displayed on the default output device (the active screen). Then execution continues at EXIT bringing the computer back to the READY prompt.

A press of the HELP key will now generate the keystroke sequence just defined.

## CREATING THE PROGRAM

If you have an assembler, you may enter the source code shown in HELPKEY.ASM and assemble it. A successful assembly will produce an object code file which you might call HELPKEY.O. In BASIC, install the program with the statements

```
BLOAD "HELPKEY.O"

SYS 4864
```

The BLOAD command puts the object code into its proper location in memory. The SYS command executes the wedge portion of the program. Press <COMMODORE+English Pound> <RETURN> to define the HELP key. Press <COMMODORE+English Pound> again after the key has been defined. Now a press of the HELP key should produce the keystrokes you have just assigned to it.

If you are ambitious or don't have an assembler or both, you might enjoy using the monitor to create the object file for HELPKEY. To do so, enter the monitor and refer to HELPKEY.MON (on page 86). Begin assembling the code at address $1300 by typing A 1300 LDA #$8D <RETURN>. This puts your first instruction into memory at $1300 and shows you the actual hex values of the code. The monitor automatically shows the next address with an A in front of it. You should type STA $0380 (or simply STA 380; the $'s are optional) and <RETURN> to enter the second line of code. Repeat this process through the BRK instruction in line 91.

Ignore any of the numbered lines which don't have instructions on them. You will see that the monitor displays the addresses shown in HELPKEY.MON but not the line numbers. The line numbers simply provide a cross reference to the "HELPKEY.ASM" assembler listing.

After line 91 has been entered, simply press <RETURN> a second time to leave the assembly mode. If you make a mistake along the way, it is easy to restart at any point. Press <RETURN> until you are out of assembly mode. Then, for example, type A 138E NOP to resume at line 85.

You may check your work by entering D 1300 1396. Use the <NO SCROLL> key to periodically freeze the display. Before saving this object code, you must patch up the error message characters in lines 83 and 85 through 87. To do this, enter M 138A. Move the cursor to the EA in location 138A and replace the following bytes by typing over them:

```
M 138A      EA  0D  41  42  EA  EA  EA  00
should be:  07  0D  41  42  4F  52  54  00
```

When the display is correct, you are ready to save this code in an object file. Enter this command: S "HELPKEY.O",8, 1300,1397 to create an object file called HELPKEY.O. Enter X to return to BASIC. Then type SYS 4864 to execute the wedge code. HELPKEY is now functional.

Use the BLOAD "HELPKEY.O" command described above to reload the program after the computer has been reset or powered up. Don't forget the SYS 4864 to initialize the program. Note that RUN STOP/RESTORE will not disable either the HELPKEY program or the current HELP key assignment.

The third way to put the object code into memory and to execute the wedge is to run the BASIC program *Helpkey BASIC Loader* on page 87. Be sure to save it before running it the first time.

You might recognize the hex op-codes from the two previous listings in the DATA statements beginning at line 190. These values are POKEd into memory and the SYS statement is executed when the program is run. The instructions for using the program are then printed on the screen.

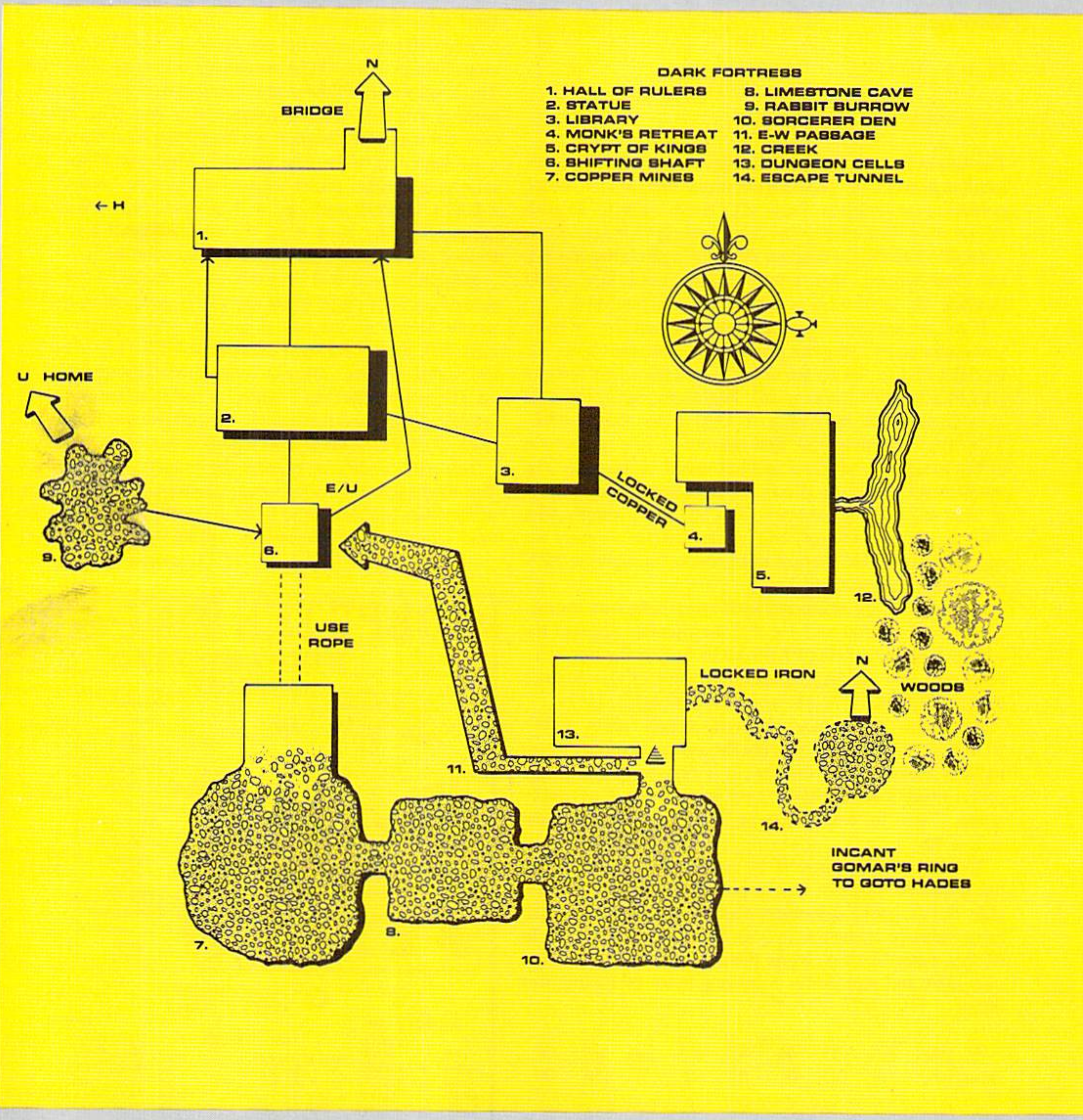
A checksum of the data values is tabulated. If you have mistyped a value, the checksum will not be correct, and a DATA ERROR message will be displayed. Check and correct the data, then rerun the program until it is right. Resave the program each time before running it.

Hopefullly you will find this utility useful. I run it as part of my boot-up program and use it quite often. For example, to put all the colons and quotation marks in the HELPKEY.ASM listing, I defined the HELP key to be "colon, quote, return." Then in Insert mode (Escape-A) with AUTO line numbering, I started at the first line of the assembler listing and pressed HELP eighty-eight times. The work to create the utility was repaid in that one application.

You may modify or expand the program as you wish. You might write a nearly identical program to define any of the other function keys. In the monitor, you can examine (and modify) the function key definitions with the com-

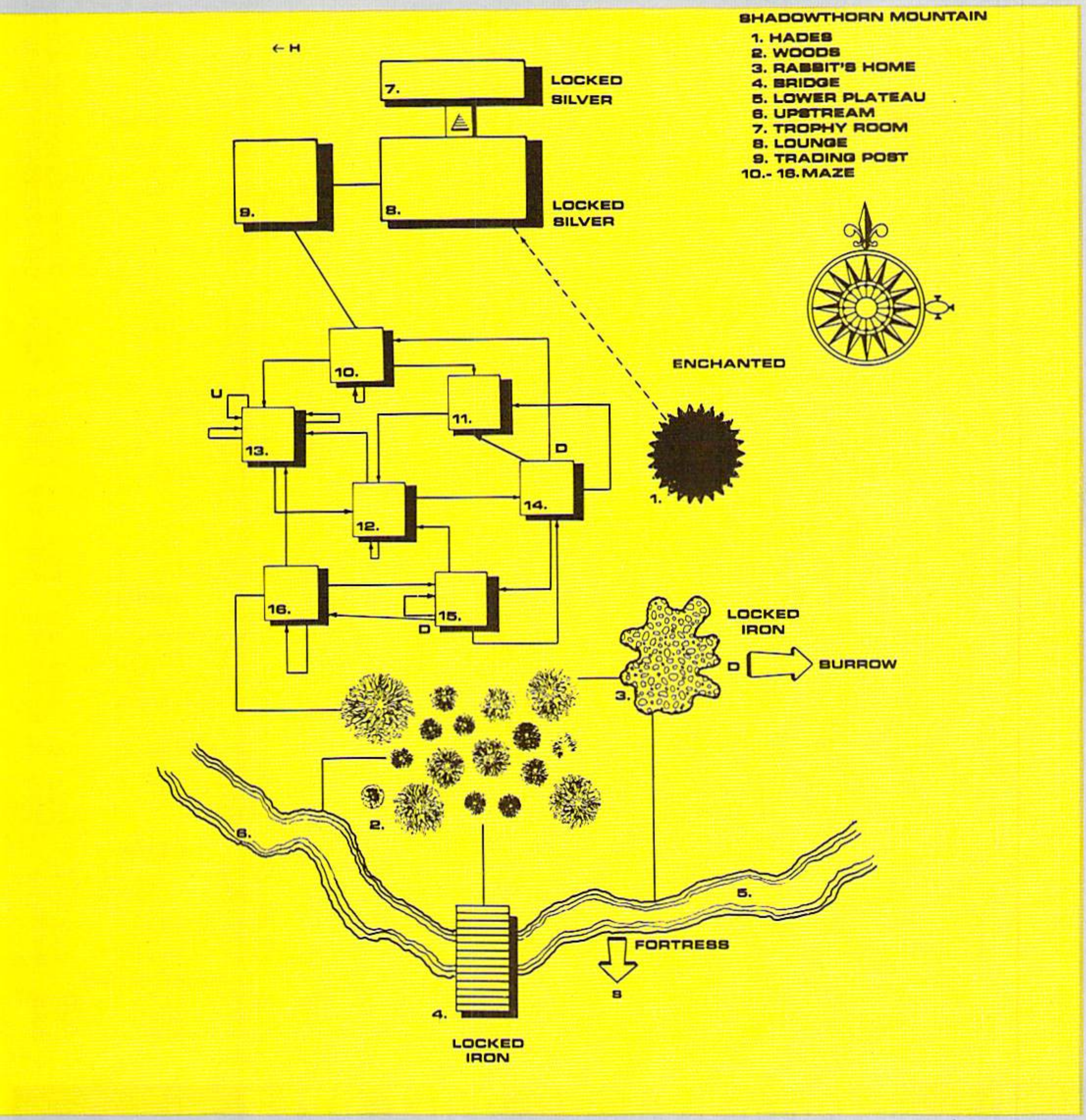
*Continued on page 37*

# Master Maps for




**_DARK FORTRESS_**, Cleveland M. Blakemore's double screen adventure for the C-128 (January '87 *Ahoy!*), has generated excitement unlike anything we've seen since...well, the same author's *Vault of Terror*, published three months earlier. While we didn't want to make life too easy for you by publishing these master maps concurrently with the program, we feel that anyone still fighting his way through the

# DARK FORTRESS




**HedgeMaze four months later has earned a little assistance. Rendered to Cleve's specifications by Art Director JoAnn Case, these maps should have lost adventurers out of the woods in no time. Remember that access to certain regions displayed can only be gained by holding a certain object or performing a specified action.**

**The author and we welcome feedback on any aspect of *Dark Fortress*.**

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# GRAPHIC WEDGE

## For the C-64

### By Robert Bixby

*Graphic Wedge* is a short ML routine which adds 11 commands to enhance graphics capability to BASIC v. 2.0.

Each of the commands is prefixed by the English pound symbol (£):

1) £H switches instantly to the high resolution screen at 24576. Color memory is assigned to the 1024 byte area beginning at 23552.

2) £T returns to the normal text screen beginning at memory location 1024.

3) £C clears the high resolution screen.

4) £P plots on the high resolution screen. The syntax is £PX,Y where X and Y may be variables, formulae, or numbers. The first represents horizontal position, and the second vertical.

5) £E erases a pixel at a given location. Its syntax is the same as £P: £EX,Y.

6) £S saves the screen to disk after asking for a file name.

7) £O loads a screen from disk after asking for a file name.

8) £U moves the entire screen one line of pixels upward. The screen scrolls continuously, so pixels set at the top of the screen will appear at the bottom.

9) £D moves the screen one line of pixels downward.

10, 11) £R and £L scroll the screen to the right and left respectively.

You can use the commands in programs or in direct mode. If you use the commands in a program, you do not have to put colons between them (10 FORI=0TO100:£U£R£D£L: NEXT). However, if you put one of these commands at the beginning of a line, it must be preceded by a colon (10 :£E100,160). The save and load commands (£S and £O) should be used only in direct mode.

#### PROGRAM ENTRY

First enter GWBASIC. When the program is entered (and a copy has been saved to disk), run the program.

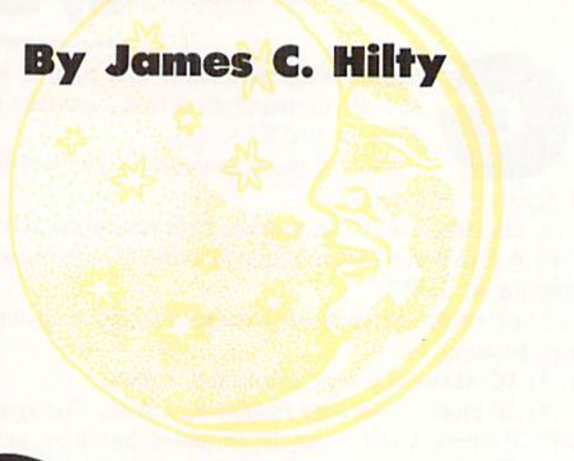
When GWBASIC is run, it will write a machine language file ("GWML") on disk. LOAD"GWML",8,1 and then SYS 49152 and the program begins scanning for your new BASIC commands. If you press RUN STOP/RESTORE, it will have no effect on your program. To disable *Graphic Wedge,* it is necessary to reset the computer (if it is equipped with a reset button) or turn it off and then back on. ☐

*SEE PROGRAM LISTING ON PAGE 95*

# MOONDOG

## For the C-64

### By James C. Hilty



Some people refer to you as a mercenary, while others look upon you as a futuristic Robin Hood. The truth probably lies somewhere in between. It seems whenever a friendly planet is in danger of alien invasion, you are there with your famous spacecraft, the Moondog.

The peaceful planet Yoma was under attack by two swift alien vessels. You and the Moondog were able to capture these ships and were towing them away with your tractor beam. Suddenly, another attack was launched against Yoma. An entire fleet of alien craft was speeding toward the planet to rescue their two ships. You must defend Yoma!

This is the background for *Moondog,* an arcade game for the C-64. After the title screen the playing screen is displayed. The Moondog is at the lower center of the screen. The two ships you have captured flank you on the left and right. You control left and right movement of the Moondog with a joystick in Port 2. The fire button fires your laser. Once an alien attack ship appears, he begins moving in a random pattern. Your goal is to shoot him as soon as possible without crashing into one of the two ships you have previously captured. If you do not hit the attacking ship fast enough, he will move in and rescue the two captured ships. Suddenly an asteroid storm develops. The asteroids are so dense that your laser cannot destroy them. If one of them hits the Moondog, you are history.

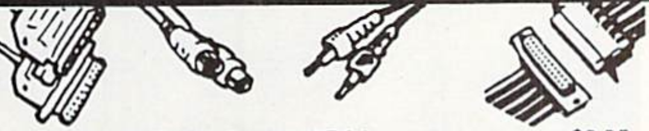
The Moondog has unlimited energy. You may keep your finger glued to the fire button and fire away. However, when you do this, you lose control of left and right movement. Once you start moving in a direction, you continue until you change direction with the joystick. You must stop firing momentarily to do this.

You begin the game with four ships. A ship is lost if you crash into one of the alien ships flanking you, or if an asteroid hits you. A ship is also lost if you take too long to hit an attacking ship. The sooner you hit an attacking ship, the more points you earn.

Your work is cut out for you and the Moondog. This is your most dangerous mission. Are you as good a pilot as rumored? Let's find out by playing *Moondog.* ☐

*SEE PROGRAM LISTING ON PAGE 100*

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# ART GALLERY



**Art Gallery Disk Sale**

The images on these pages are onw available on a monthly disk. Multicolor images are supplied in *Koala* format, while high-resolution images are in *DOODLE!* format. Included are a slide show for easy viewing, along with a bit map dump for your 1525 printer or properly interfaced equivalent. A sample *Art Gallery* disk with slide show and printer dumps is $10; or send a stamped and self-addressed envelope (business size) for a listing of available *Art Gallery* collection disks. Prices shown are for US and Canada. All others add $3 per disk. New York State residents please add appropriate sales taxes. Disks may be ordered from Morton Kevelson, P.O. Box 260, Homecrest Station, Brooklyn, NY 11229.

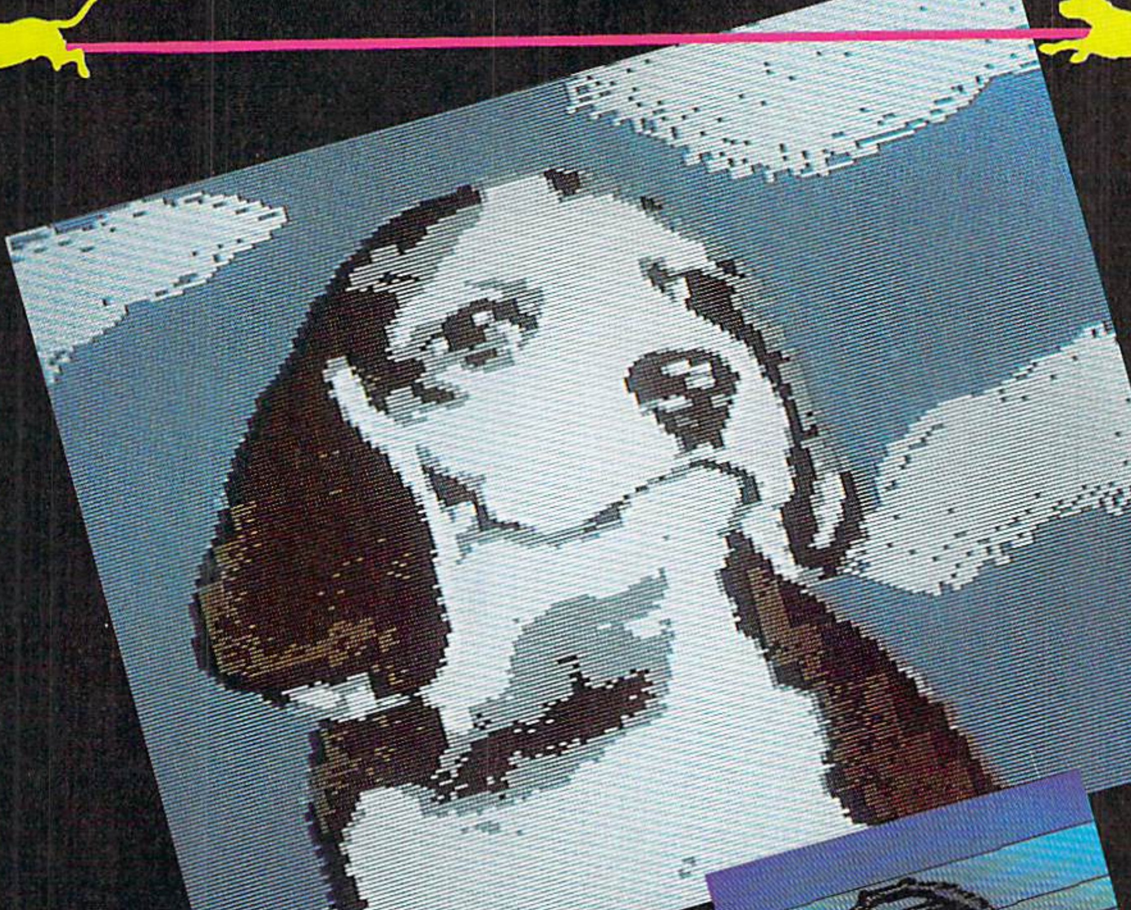
**Contribute to *Ahoy!'s* Art Gallery**

The *Ahoy! Art Gallery* offers the opportunity for fame and fortune to any and all aspiring Commodore artists. Simply send Morton (see address above) your work on disk indicating the drawing package or file format of the images. Inclusion of a self-addressed post card will guarantee an immediate response. All graphics produced on the C-64/C-128 and Plus/4 computers are eligible. In exchange your work will receive the opportunity for display in these pages. All published works will receive royalties based on the monthly *Art Gallery* disk sales. In addition, both published and unpublished images may be included on the various *Art Gallery* collection disks.

Note that the *Art Gallery* is not a contest. Published pictures are selected in an arbitrary and capricious fashion by the *Ahoy!* Art Director based solely on the artistic merit of the individual images.

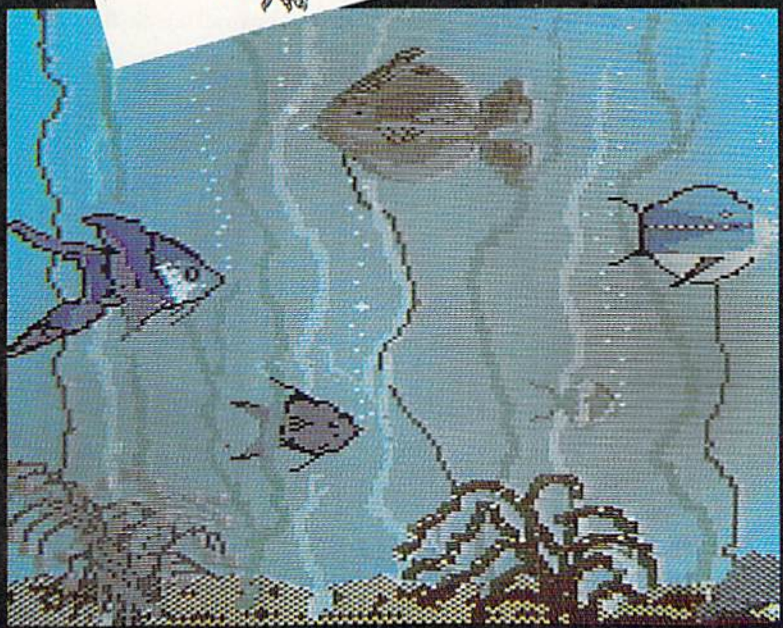












**In a fit of pique with the human race, Art Director JoAnn Case has peopled this month's *Art Gallery* with animals, both domestic and imported. *Mickey Mouse* was *DOODLED!* by Dale E. Clark (Flint, MI), as was *Eagle* to its lower right. *Doggy*, next right, bears the pawprint of Roger Bischoff (Walbridge, OH). Immediately below it is *Ibex Ram*, generated on *Koala* by Michael Mikottis (Berwyn, IL). Think of it as a graphic representation of computer memory. At the extreme lower left, Gary Preston (Snyder, TX) serves up *Parrot* on *Blazing Paddles*. Next right is *Window Cats* by Rik Keene (Natwick, MA) and *DOODLE!* And finally, catch *Fish* by Pam Wiley (Ft. Worth, TX) on *Koala*.**

# WALL CRAWLER

## For the C-64

### By Tony Brantner

Climbing the side of a building might be easy for superheroes and giant apes, but *Wall Crawler* is sure to challenge even the most experienced gamers.

You'll need *Flankspeed* (page 85) to type in and save a copy of *Wall Crawler*. After loading the game from tape or disk, type NEW followed by SYS 49152 to start. The top of the screen shows the remaining lives (you start with three), current score, timer, high score, and level. After the Wall Crawler enters from the bottom of the screen, you'll need a joystick plugged into Port 2 to guide him.

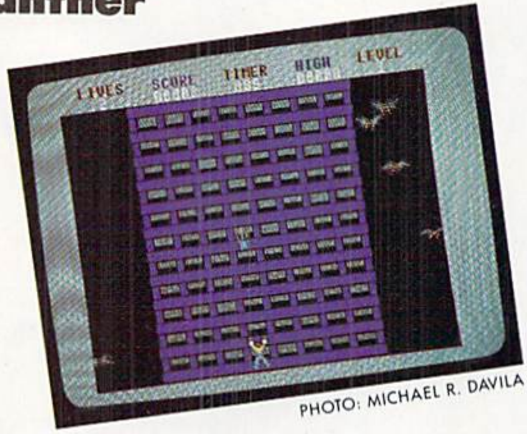


PHOTO: MICHAEL R. DAVILA

Climbing each section of the building is no simple task. Watch the windows, since they keep opening and closing. If one slams on the Wall Crawler's fingers, or if he tries to climb over one that's already shut, he'll fall to his death.

There are also giant birds to contend with, and flower pots that drop from the top windows, both of which can knock the Wall Crawler off the building. Sounds like a lot to worry about, right? Well, to top it off, there's also a timer to race against. If it reaches zero, down he goes. But if he does make it to the top, you'll be awarded 100 points multiplied by the current level plus whatever is left on the timer. You'll then move on to the next section of the building, which has faster birds, flower pots, and windows. There are 17 levels in all, and you can use the SHIFT-LOCK key to freeze the game. □

*SEE PROGRAM LISTING ON PAGE 88*

Reader Service No. 170

# ILLUSION MASTER
## For the C-64
### By Robert B. Schofield

Have you ever wanted to hide particular files or programs from prying eyes? *Illusion Master* allows you to make any file name vanish from your disk directory, or make the entire directory vanish if so desired. The program is extremely easy to use, and due to the number of checks and error traps built into the program, very hard to "crash."

**DIRECTORY VANISH**

The directory is made to vanish by placing the following bytes in position 144-149 of the block availability map (BAM)

```
$14, $14, $14, $00, $00, $00
```

Due to the way the DOS converts a directory into a pseudoprogram for listing, this fools the DOS into thinking the directory has been read in before it even starts. The $14s are delete characters which erase the line number 0 given to the disk name when it is in pseudo-program form. The three $00s signal the end of the program (or pseudo-program in this case) and so terminate the load procedure. The bytes which originally occupy position 144-149 are stored in an unused area of the BAM (position 177-183) so that they can be restored later, causing the directory to reappear.

**RESTORE INVISIBLE DIRECTORY**

The bytes moved to position 177-183 in the block availability map by the Directory Vanish routine are restored to their original position (144-149), thus causing the directory to reappear.

**FILE VANISH**

A file is made to vanish by storing the file type in an unused area of the disk directory (position 22 of the file entry) and then performing an ordinary DOS "SCRATCH" command. (This does not erase any data, but changes the file type to "scratched" and frees the blocks allocated by the BAM.) The file type is stored so that the file can be made to reappear without having to query the user for the correct type.

Note: as mentioned in the instructions, an invisible file will be overwritten if another file is saved to the disk, since the blocks have been freed in the BAM.

**RESTORE INVISIBLE FILE**

This is accomplished by restoring the file type which was stored when the file was made to vanish, and performing an ordinary DOS "VALIDATE" command. □

*SEE PROGRAM LISTING ON PAGE 103*

## IMPORTANT NOTICE FOR *BUG REPELLENT* USERS!

The *Bug Repellent* programs you've been using to type in BASIC programs printed in *Ahoy!* have been replaced. New versions for the C-64 and C-128 appear on page 84 of this issue.

To generate line codes that match those printed in *Ahoy!*, you must type in and use the new *Bug Repellents*.

Why the change? The new programs provide instant error detection and an optional autosave feature. We're sure that the added convenience will more than make up for the time it takes to type the new versions in.

## RUPERT REPORT

*Continued from page 25*

mand M 1000 10FF. The first ten bytes are values corresponding to the string lengths assigned to each of the keys. (HELP is key number ten. The length of its string is in location $1009.)

Beginning at location $100A are the actual characters assigned to the keys. The alphanumeric display at the right of the screen may help you recognize some of the function key assignments. If F1 has a string length of $06, for example, its definition extends from $100A to $100F. The definition for key F2 would begin at location $1010 and extend for the number of bytes indicated by location $1001, and so forth.

To appreciate the power of the Kernal routines, you might consider rewriting any of the routines we have used. Some may not be too difficult to duplicate, but you would probably agree that there are certainly better things on which to spend your time. Refer to the *Programmer's Reference Guide* for details and examples of all the Kernal routines. Put those Kernal routines to work and you will write a better program. ☐

*SEE PROGRAM LISTINGS ON PAGE 86*

# STARTUP

## For the C-128

### by Michael R. Davila, Michael Kress PhD, and Paul Maioriello

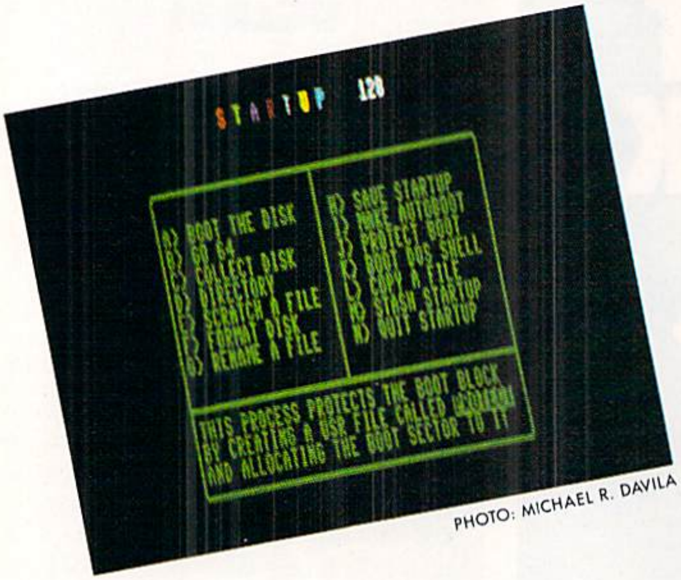



PHOTO: MICHAEL R. DAVILA

*Startup* is a multipurpose DOS utility designed specifically for the C-128. *Startup* contains all the popular DOS functions, plus a routine which allows you to create autobootable programs on your disk. The program will adjust itself to run in either 40 or 80 columns, depending upon the 40/80 display key being depressed.

The program also contains a unique feature which stashes the program in an area of memory, so that you can load and run any other BASIC program. When you are done with the other BASIC program, press f1 and RETURN to recall *Startup.* The machine language code which does this (lines 600-630) resides at $C00-$C85, decimal 3072-3205. This ML lets the computer act like a RAMdisk, so you can store any BASIC program while you run another. You may implement this routine in any of your favorite C-128 utilities or games.

*Startup* provides the capability to correctly validate a bootable disk. A bootable disk cannot be validated by the DOS collect command. This is because the autoboot signature (i.e., the "CBM" characters) that identifies the block as bootable lies in the part of the sector where DOS (and the collect command) expects to find the pointers to the next track and sector. The collect command works by reading these pointers in order to determine what blocks should be allocated. The collect option on the *Startup* menu determines whether or not the disk is bootable by examining the boot sector to see if the "CBM" signature exists. If it does not, it immediately executes a normal collect. If it determines that the disk is bootable, however, it replaces the "C" and "B" with null bytes so that collect will think the boot block is a normal one block long file. After making the change, a normal collect is performed. When the collect is completed, the signature is restored so that the disk will still be bootable.

The *Startup* program collect routine informs you as it goes through these steps. Note that in order for the solution to be foolproof a dummy directory entry should be created to prevent the boot sector from being marked as available by the collect routine. *Startup* provides a way to establish this entry by using the Protect option. This option should be used immediately after formatting a new disk. Taken together, these parts of the *Startup* utility allow you to effectively manage your bootable disks and to validate them without fear of adversely affecting the boot sector.

Type in, save, and run *Startup.* The program provides instructions when an option is chosen off the menu. We advise you to use a test disk at first, to make sure that you have typed in the program correctly. The program could trash the disk if a mistake has been made. □

*SEE PROGRAM LISTING ON PAGE 96*

# BRAIN GAMES FOR THE WHOLE FAMILY

## Three Multiplayer Strategy Games for the Commodore

### By Joyce Worley and Arnie Katz

**Featured This Month:**



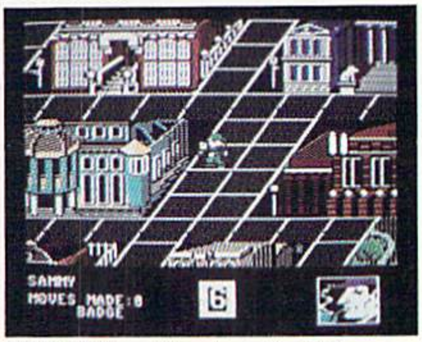
Computer games have come a long way since millions of Americans first experienced the delights of batting a square ball back and forth in *Pong*. Action contests dominated videogaming and, to an extent, the home computer field for several years.

Fortunately, since the typical computerist is already past his or her peak of reflexes and coordination, arcade-style programs aren't the only games in town. When publishers noticed that a steady diet of shootouts and maze-chases had begun to pale on the public, they reacted by widening the variety of their offerings.

One of the most encouraging trends is the proliferation of titles which exercise mental muscles instead of physical ones. At first, virtually all were either adventures or military simulations, but subject matter more suitable for family-social occasions is now on the rise. *Ahoy!* covered several of these "brain games" in the March issue, and there's already a batch of new ones piled next to the Commodore.

*Selchow & Righter's Scrabble* is unquestionably the world's most popular crossword boardgame. Leisure Genius, a division of Britain's Virgin Games, has produced a computerized version of the non-electronic classic for the Commodore 64/128. Electronic Arts is the distributor.

*Scrabble* should be especially appealing to the gamer with a shortage of qualified opponents. Though up to four human players can compete, the program can generate up to three robot word wizards for solitaire sessions. The skill of each computer-directed foe can be adjusted on a one-to-eight scale. At the easiest setting, the computer opponent averages a score of 200 per round. This rises to about 400 at level eight, so *Scrabble* can provide spirited opposition for novices and champions alike.




**221B Baker Street:** *solve 30 cases. READER SERVICE NO. 165*

The disk includes a vocabulary of over 20,000 words drawn from "The Official Scrabble Player's Dictionary" published by Pocket Books. It challenges any words it doesn't have in memory, but it does accept a player's assurance that a proposed placement is admissable.

The computer version adds one element which is absent from the conventional boardgame: clock pressure. Time per turn can be as little as 10 seconds or as long as 9 minutes, 59 seconds.

The attractive electronic gameboard is easy to read, though the special squares are indicated with symbols rather than words. The bonus squares are double letter, double word, triple letter, and triple word.

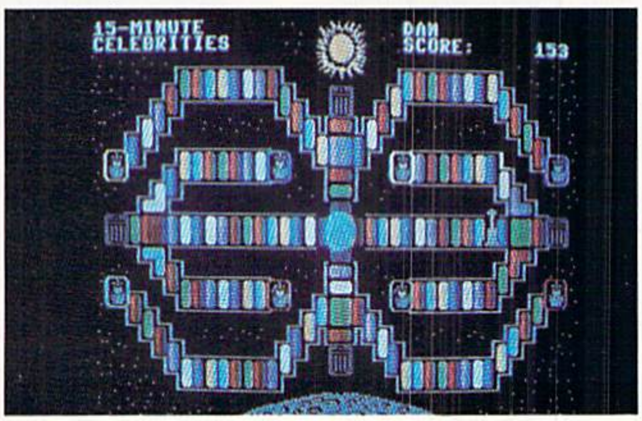
At the start of each turn, a menu offers eight options. These include juggling the tiles on the rack, picking a new set of letters, passing a turn, or getting a "hint" word to break a mental logjam.

It takes a fair amount of keyboard manipulation to position a word, but the process is easily learned. The player types in the word, hits RETURN, and then uses the cursor keys to position the first letter of the entry on the appropriate space. One further keystroke tells the program whether to display the word horizontally or vertically.

*Scrabble* fanatics who have a bountiful supply of willing and able competitors at hand don't really need a computerized version. But for those who can't find enough opponents of equivalent skill, this disk is like manna from heaven.

Another computer program based on a boardgame is *221B Baker Street* (Datasoft). Steven Duboff, Jeff Harth, and John P. Sohl have transported Jay Moriarty's 1976 creation to the Commodore with sensitivity and fidelity. It's so true to its inspiration that players "roll" an electronic die to see how far

*Players unclog* **Quizam!'s** *satellite-clogged spacelanes by answering trivia questions on eight levels. Setting #1 is recommended for multiplayer games. READER SERVICE NO. 166*



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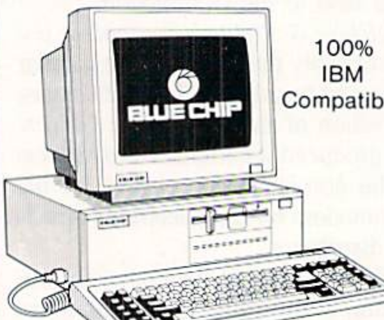


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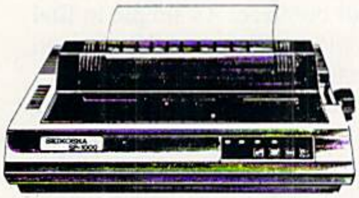
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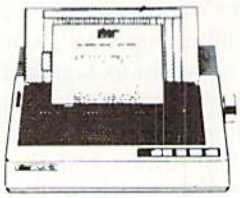
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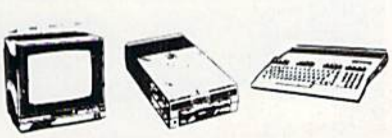
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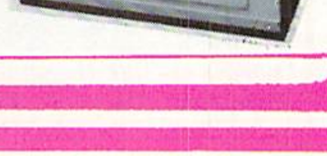
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they can move. The computerized mystery for one to four participants is even better on the monitor than it was on the tabletop. Speech synthesis and outstanding animated graphics enhance an already appealing game. Players take the roles of Sherlock Holmes, Dr. Watson, Irene Adler, and Inspector Lestrade in a lighthearted competition to solve one of 30 cases.

Simulation-happy gamers must shift mental gears if they want to enjoy *221B Baker Street,* since the play features are symbols, not representations, of reality. For example, any sleuth may "lock" a location with a badge, making its clues inaccessible to rivals with keys. There is no rational reason why locking a location should use up a badge, forcing the player to return to Scotland Yard to get a new one, nor is there a realistic explanation for the fact that Lestrade should already have a badge.

Guess what? It doesn't matter. These are mere trappings. What counts is that *221B Baker Street* is a clever and captivating strategy game. The players ramble around London, checking for clues in 16 major locations. The clues are given in code, so detectives are spared the annoyance of constantly turning away from the screen to avoid seeing privileged information.

There are 20 possible codes, four lettered groups with five numbered subgroups each. The program assigns each detective a letter and number at the start of the game. The player may change numbers during play to throw opponents who break the original code off the scent.

The gamer collects clues to reach the solution. To win, the player must return to *221B Baker Street* with a badge. The sleuth checks his/her hypothesis while rivals avert their eyes. If the answer is correct, everyone gets to watch the case's solution screen which eloquently explains the reasoning which led to the conclusions. A rating screen gauges the winner's ability, based on how many clues it took.

Players can try to break their opponents' clue codes, lock locations, use secret tunnels, hire a cab, or change their own clue codes. It often takes a trip to a specific location to take advantage of an option. This keeps things moving at a brisk pace, as sleuths rush around the multiscreen, pseudo 3-D perspective playfield.

The documentation is informative and a joy to read. It interweaves apt quotes from the Arthur Conan Doyle stories with concise descriptions of each of the salient points in the routine of play. Because the editors paid rigorous attention to paragraphing and the use of boldface, it's simple to find major topic headings quickly even in the middle of a hot game.

The computer version of *221B Baker Street* is a magnificent strategy game; not only one of the best titles of this young year, but a true classic disk.

*Quizam!* (Intersel, distributed by Electronic Arts) has never been a boardgame. In fact, many of its features

# GAMES: FROM DREAM TO DISK

## How Computer Entertainment Software Is Designed

### By Arnie Katz and Bill Kunkel

The role of the computer game designer has changed, often radically, several times since the early 1970s. The latest revolution is underway right now, and the so-called Producer System has already had a profound effect on the games we play on the Commodore 64/128 and other systems.

During the videogame era, 1978-1982, game authors were "those 20-year-olds with the Mercedes 300 SLs." The description isn't far off the mark,




*Digitized images of Hulk Hogan and foes were source of the graphics in* MicroLeague WWF Wrestling. *Because the raw digitizations were rough, artists used* Paintworks *to smooth out the crowd scenes, main figures, and ring ropes.*

could never exist except inside a computer. What parlor game could offer a choice of eight boards?

Like all trivia contests, *Quizam!* has a couple of thousand esoteric questions. What makes it superior to other electronic and non-electronic titles is that it is, trivia aside, a much more entertaining and detailed game. Too often, the quiz authors are more knowledgeable about trivia than gaming. Dan Skelton knows gameplay as well as he knows his facts, so *Quizam!*

As befits a product from space-minded Interstel, *Quizam!* has a science fiction theme. There are many satellites clogging the spacelanes, but removing them has proved difficult. The computers on the artificial moonlets have all malfunctioned and now ask for trivial facts instead of access codes. The players are theoretically preparing to deactivate the satellites by practicing on a computer simulation of the situation.

Players capture satellites by answering trivia questions. To receive credit for a captured satellite, the player must convey it to a disposal station.

The option screen allows the players to adjust the number of participants, the difficulty, the length of the session, the type of command control device (joystick, keyboard, or paddle), and the gameboard.

There are eight levels of difficulty. Setting #1 is recommended for multiplayer games, while the higher levels are more appropriate for solitaire sessions.

The joystick control system is fairly ingenious. Arrows appear next to the four possible answers to each *Quizam!* question. Pushing the stick in the corresponding direction enters the choice. The keyboard control scheme utilizes the "f1-f7" keys and is best suited for solo play.

How fast a player answers a question governs how many spaces his or her gamepiece moves that turn. A shrinking bar on the screen helps players time their answers so they can land on desirable squares by exact count.

In the long run, Quizzer is the most valuable feature of *Quizam!* This module allows the user to enter new questions. Any trivia buff can turn mastery of little-known facts into a playable game with surprising ease. The documentation contains an extensive explanation of Quizzer which should allow most computerists to start entering questions immediately.

No one would contend that computer games are automatically better than non-electronic ones. Everyone has played too many bad computer games to say something like that seriously. By the same token, the computer frequently makes games more enjoyable by assuming a lot of bookkeeping and number-crunching chores which many people do not enjoy. This is certainly true for all three of the programs discussed in this article. So the next time you're looking for some family fun, leave that boardgame in the closet! ☐

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at least with regard to the more successful ones. Virtually immune to the inroads of piracy, hit videogame cartridges sold millions of units and earned their creators six- or even seven-figure royalty checks.

Videogames were relatively simple programs compared to the current crop of computer entertainment. They often contained no more than 2K or 4K of code. The game machines had rudimentary sound and crude visual resolution. One person could, and did, do the whole job from conception to finished product. It doesn't take a modern Mozart to string together a few beeps and boops for sound, or a Rembrandt to draw a tiny spaceship using two parallel lines with a circle in the middle.

The main difference between the videogame designer of 1981 and the computer game author of two years later is that the latter can't afford the Mercedes. A hit computer game sells 100,000 copies, though a few have done much better, and the royalties on that won't land anyone on "Lifestyles of the Rich and Famous."

Although the first popular 6502-based computer, the Apple II/II+, was miles ahead of videogame machines, the sound was puny, and the graphics didn't have sprites. Perhaps more importantly, Apple owners didn't have high expectations for software. Like virtually all the designers of the 1980-1984 period, most Apple users were hackers or computer science students. They viewed a game program as the fruit of one experimenter's research into the mysteries of the microprocessor.

The introduction of the Commodore 64 struck a major blow at the single-author system of game design. The SID audio chip opened the way for truly impressive sound effects and music. Publishers quickly learned that creating extensive background music was beyond all but a few of the programmers who had stuck a few simple notes into their games.

The obvious solution: bring in a computer music expert who could maximize the audio. Russell Lieblich, the Jazz Scats, and other computer composers proved that a talented specialist could significantly enhance the finished product. Unfortunately, the same person who could write an original sonata couldn't necessarily invent the rest of the game.

Electronic Arts, started by Apple alumnus Trip Hawkins, is based on the premise that no single game author can match the overall excellence which a team of specialists can provide. The high quality of EA releases, in turn, fueled computerists' expectations.

Activision is another publisher which has capitalized on the Producer system. Instead of trying to turn a musical marvel like Lieblich into a well-rounded game designer, Activision has let him provide the sound for a wide range of games, including 1986's *Howard the Duck*. Similarly, David Crane is now a designer and project supervisor rather than a do-it-all game auteur as he was during his videogame days.

#### Designing Today

Today, virtually all entertainment software publishers employ some variation of the Producer system. Some have in-house staffs, other rely on outside design and programming houses, but no major publisher relies on "over the transom" submissions from one lone programmer/designer. Every company wants to find diamonds in the rough, but the smart ones know that the supply of windfall programs is limited and growing more so.

A computer game is like a child. While no two grow up precisely the

same way, there are many similarities in their development. Let's follow one game, Micro League Sports Association's *MicroLeague WWF Wrestling,* from start to finish to get an idea of how it's done.

There are nine steps in the design of a game. These are Concept, Proposal, Design, Programming, Graphics, Testing, Fine-Tuning, Documentation, and Publication.

Before anything else can happen, someone must come up with a concept. The proposal first saw the light of day in late 1985 during one of Subway Software's weekly design meetings. The team (Bill Kunkel, Joyce Worley, and Arnie Katz) generally spends Friday afternoons tossing around ideas for new computer games.

Wrestling looked like a good bet for Subway. The partners were familiar with the subject matter, and thought they could do a game which evoked enough ring glamor to be successful.

The next step is to prepare a proposal. This document of three to ten pages outlines the program for prospective publishers. A proposal describes the theme of the program, the format, the anticipated memory and audiovisual requirements, the routine of play, the most striking features, the market potential, and the competitive situation with regard to other computer software titles. There's frequently a biography of the members of the design team.

The first company which looked at the proposal for the wrestling game bought the idea. Because our example is real, not ideal, the deal didn't pan out.

But then Micro League Sports Association, best-known for its statistical baseball simulation, took the bait in mid-1986. The Delware-based concern signed the usual advance-against-royalties contract, and Subway Software polished and submitted the design specification. The agreement divided the project into stages, with a payment due upon completion of each milestone. So Subway collected a payment on signing, and collected a second when the team submitted the specs.

The design specifications document is crucial to the proper development of a game. It tells the programmer, graphic artist, sound expert, and others who will implement the concept exactly how everything is supposed to work. The 30-page report on *MicroLeague WWF Wrestling* defines the program as a joystick- or keyboard-controlled action strategy simulation which will be simultaneously developed on the Commodore 64 and the Atari ST.

The document covers the routine-of-play, runs through the procedure for calculating the result of each interaction between the wrestlers, elaborates the proposal's descriptions of audio and visual effects, and provides formulas to regulate all variables. The design specifications for an adventure would also include a step-by-step explanation of all plots and subplots, descriptions of objects which the protagonist can manipulate, and a map which shows all locations in the game.

A development meeting which involved Subway Software, executives at MLSA, and the director of the in-house programming staff proved pivotal in the development cycle. The publisher suggested some changes, announced its intention to bid for a license from the World Wrestling Federation to use its grapplers, and decided to ease the strain on its own resources by finding an outside group to work with Subway Software.

Two programming houses offered proposals. Both were good, but Riedel Software Associates submitted a bold scheme to use digitized video images of Hulk Hogan and his foes. Mike Riedel, who had previously designed *Spy Vs. Spy* and *Spy Vs. Spy II* (Accolade), had a data compaction technique which squeezed enough short animations onto a disk to illustrate two or three matches, plus interviews, ring entrances, manager interference, and other features. RSA produced a short animated demonstration disk which showed a digitized action sequence and a static (non-animated) demo disk of a Hulk Hogan interview scene. They got the contract, and Subway Software revised the design specs to allow for Riedel's innovative graphics.

Things proceeded on several fronts during the late summer. MLSA negotiated a licensing contract with the WWF. Titan Sports asked for, and got, a hefty slice of the royalty pie in exchange for the right to feature Hulk Hogan and unspecified rulebreakers in a computer game. Titan also agreed to provide the raw video for the digitized graphics.

The WWF wanted to choose the matches for the Game Disk. Subway Software prepared a proposal for MLSA's Paul Kelley and the WWF's Dick Glover to discuss. A major limitation is that the video-based graphics can only portray pairings which have actually taken place, preferably several times. This eliminated rising stars like Jake "The Snake" Roberts, who had not fought Hogan yet. A follow-up teleconference finalized the specific holds for each of the matmen.

Subway Software worked on the details of the "Game Disk," while Riedel Software Associates put together a programming group and refined the digitization process. When MLSA approved the "Game Disk" specifications, triggering payment of another portion of the advance, it was time to move to the implementation phase.

When most computer games were

designed by one person, graphics often came after the rest of the program. Often today, a design team produces a non-interactive animated demo disk to show the basic play-action, codes the rest of the game, and then finishes the audiovisuals. For this game, in which the visuals are so vital, programming of game-action and video digitization took place concurrently.

Kunkel, Worley, and Katz received videocassettes of applicable matches on both in VHS and U-matic formats from Craig Leathers, the wrestling expert at Video One. They watched the VHS tapes and found the location of every piece of usable video.

In practice, the programmers discovered that Super Beta yields a much steadier image, so they converted all U-Matic footage to that format. After matching Subway Software's notes with the Beta tape, RSA used a Hippotomus digitizer with customized software to generate the images for the game. Since the raw digitizations are a little rough, artists used Activision's *Paintworks* to smooth out the crowd scenes, main figures, and ring ropes.

As with most computer games, the main display and the user interface was the design team's first priority. Mike Riedel drew upon the design specs to create roughs for two different screens on C-64 disk. Most of the playfield features, like the commentary box below the ring window, were not in finished form at this point. Mike Riedel, Bill Kunkel, and Arnie Katz filled in the blanks on the chosen screen and determined how the joystick-actuated menus would function during play.

RSA digitized a few sequences on a disk so MLSA could judge the results. This led to a more ornate demo disk, which let a computerist initiate any hold by either combatant in the Hulk Hogan versus Randy Savage version.

MLSA used this version, still without play-by-play commentary or the joystick control scheme, as a preview for big discount and electronics specialty store buyers and distributors. An enthusiastic reception encouraged MLSA to use the demo to prepare photography for the program package.

Hopes of getting to the stores before Christmas faded, because turning video into computer graphics took longer than anyone expected. Despite some elegant code-crunching by Riedel, it had also become clear that *MicroLeague WWF Wrestling* could only have two matches with attendant trimmings on a single floppy for the C-64 and on two disks for the Atari ST.

Fine-tuning began long before the completion of programming. Alpha play-testing and MLSA executive review began to ferret out the glitches and smooth out the design. An early January meeting of the entire project team produced a list of 21 changes. Some were as minor as allowing the user to name the arena, while others addressed major issues like graphics, music, and the routine of play. Raising the odds against a grappler successfully executing a major or finishing hold early in the bout was one of the major changes. Up to this point, it was too easy for a player to devastate the opponent right after the opening bell.

Beta testing started as soon as MLSA had a joystick-interactive version of the Hogan v. Savage match which incorporated the 21 changes. Software publishers use independent testers because they bring disinterested objectivity to the program. Many also patronize professional software editing and evaluation services, but Subway Software's association with the project made such assistance redundant in this case.

The Beta testers discovered a serious weakness: The pace lagged whenever neither grappler was performing a maneuver. Riedel added more frames to animated sequences which appear when there is a temporary stalemate to make them more diverse and lengthier.

The design team sifted through the suggestions of alpha and beta players to produce the final test version of *MicroLeague WWF Wrestling*. With minor adjustments, it is the edition which is now in the stores.

Documentation came last, as it does for almost all entertainment programs. Publishers are giving much more attention to the rules than formerly, so most docs get written during a month, rather than a night, before release. In this example, Subway Software wrote the instruction booklet which accompanies the disk.

And now, after about 18 months of design and development—equivalent to about eight man-years of work—*MicroLeague WWF Wrestling* has made the rocky journey from wild idea to software title. And now you too have experienced its evolution. ☐

## OGRE
**Origin**
**Commodore 64/128**
**Disk; $39.95**

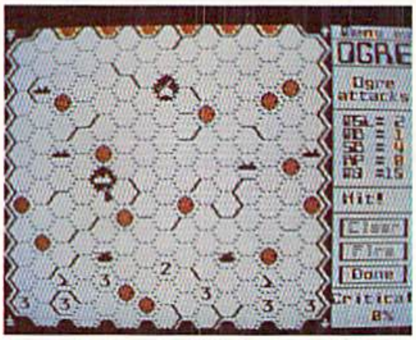
Like most hobby groups, the wargaming community has always displayed partiality toward certain aspects of its special interest. For Trekkies, it's near-worship of Spock; among wargamers, it's a passion for tanks. Steve Jackson's boardgame *Ogre* is an ultimate expression of this pure love.

Although *Ogre* was first marketed to "hard corps" military simulation fans, its simple rules, lightning pace, and intriguing tactics have won it a much wider audience. Many gamers who wouldn't know a hovercraft from a hot dog have discovered that *Ogre* can be highly addictive.

Steve Meuse's adaptation for microcomputers has caught the essence of this futuristic battle against cybernetic super-tanks. Even those who don't ordinarily enjoy wargames may want to make an exception in the case of *Ogre*. It's that good.

The joystick control system preserves the spirit of the non-electronic *Ogre*. The computer version is just as exciting and fast-moving as the original boardgame.

David Lubar's translation for the Commodore preserves Meuse's fine work intact. The control icons and unit battlefield symbols are unambiguous and attractive, and the sounds of gunfire increase the excitement of the com-




*Can your tanks top the colossal* Ogre?
*READER SERVICE NO. 167*

bat phase.

The hexagonally gridded battleground shows important terrain features. A module included on the disk allows the computerist to create customized playfields with unique combinations of craters and obstructions.

The command control system draws heavily on the user interface developed for the Macintosh and other 16-bit computers. Commodore owners who have had experience with GEOS will already know the procedures in a general way, and those who don't will be able to learn in a few minutes.

For instance, the player deploys troops by moving a pointer to the bank of icons located on the right side of the screen and pushing the action button. The background of the icon turns dark to show it has been selected. When the gamer moves the pointer to the map and hits the action button again, a unit of that type is positioned in the indicated hexagon. Each press of the button deposits another unit of that type on the battlefield.

Movement and fire utilize a menu of choices. To move, the player puts the pointer on the desired unit and, holding down the action button, drags the pointer to the destination hex.

Combat is initiated using a menu in the lower right corner of the screen. A handy option allows the player to see the movement and fire range of any piece at a glance. The commander selects this menu option, moves the pointer to the unit, and pushes the action button. All hexes within a unit's movement limit turn green, and those upon which the unit can fire change to blue.

*Ogre* is a struggle between one colossally powerful armored vehicle, the Ogre, and a mix of weaker but more numerous infantry and tank units in the 21st Century. The non-*Ogre* player must blend the elusiveness of the Ground Effect Vehicles (GEV) and the firepower of howitzers in order to stop the juggnernaut.

*Ogre* can be enjoyed head-to-head or as a solitaire game in which the computer controls the Ogre. Dallas Snell's artificial intelligence program makes *Ogre* one of the best strategy games available for those who do most of their playing against the machine. Two different types of Ogres are included in the program, so those who don't feel sufficiently challenged by the weaker one can raise the difficulty by substituting the even more awesome Mark V model.

Despite the fact that *Ogre* does not have a plethora of units or a rule book the size of the Yellow Pages, it won't become "played out" after a few sessions. It takes a combination of foresight and daring to destroy an Ogre, and it's a lot of fun trying.

Origin Systems, 340 Harvey Rd., Manchester, NH 03103 (phone: 603-644-3360). *—Steve Davidson*

## IWO JIMA 1945
## FALKLANDS 82

**Firebird**
**Commodore 64/128**
**Disk; $19.95**

The publisher complements its selection of premium-quality programs like The Pawn with the budget-priced Super Silver Disk line. Each package contains two or even three respectable games, many of British origin, for less than the cost of most one-program packages. While the titles marketed under the Silver Disk banner are generally a year or two behind current state-of-the-art, they are almost invariably well-chosen and usually represent quite an entertainment value.

Two relatively simple solitaire wargames designed by John Bethell comprise the latest Silver Disk offering. Both involve landing on a beach against a stubborn enemy and advancing across contested terrain. In *Iwo Jima 1945,* the Commodore owner commands the U.S. forces in this historical World War II confrontation against Japanese troops guided by the computer. The other game, *Falklands 82,* casts the gamer as the leader of the British invasion, pitted against a computerized Argentine defense garrison.

Clearly, the former is of vastly more




**Falklands:** ***relive the epic conflict.***
*READER SERVICE NO. 163*



**Desert Fox:** ***skunk the Afrika Korps.***
*READER SERVICE NO. 164*

interest to an American than the latter, but the Falkland game has its merits, too. Author Bethell has wisely understated the morale and leadership problems which beset the Argentine army, so the player won't win this in a boring walkover. *Falklands 82's* five levels of difficulty insure that even excellent strategists will have to exert themselves to obtain the victory.

Though the two games have similar routines of play, their command control systems are quite different. *Iwo Jima 1945* allows the player to enter commands for each unit using the joystick in response to onscreen prompts. *Falklands 82* employs a set of single keystrokes which is all right, but doesn't proceed quite as rapidly.

Bethell's two designs rate better as games than as simulations. Certainly, they are far less detailed than the typical computer wargame from SSI or SSG. The programs take factors like terrain effects and line of sight into account, but differentiation among units is relatively minimal, and many elements of the two engagements are represented abstractly.

Firebird, P.O. Box 49, Ramsey, NJ 07446 (phone: 201-934-7373).

*—Arnie Katz*

## DESERT FOX

**Accolade**
**Commodore 64/128**
**Disk; $19.95**

This may be the best game program

for the Commodore with a list price under $20. Despite the sound of the title, *Desert Fox* is not one of those ponderous military simulations which require months to fight a single battle. *Desert Fox* is a set of arcade-style contests linked by a strategic element.

This joystick-driven contest is set in the early 1940s in North Africa. Germany had Afrika Korps Commander Erwin Rommel. His chief antagonist, the British, now have you.

There are five different arcade challenges in *Desert Fox*. Most of the action is set up on a strategic map of the whole campaign.

When the game is booted, an option screen gives the computerist the opportunity to practice any of the five action screens or plunge right into a campaign. Some tuning up is highly recommended, because an inability to play any of the five segments may doom even the most savvy general.

All the mini-games give the player a view out the front of a British Sherman tank. In the Convoy sequence, a machine gun protrudes from both sides of the tank. A British convoy passes in front of the screen as German Stukas overhead drop bombs. Allied Spitfires dogging the Stukas make targetting more tricky. The idea is to save the convoy by knocking off as many German aircraft as possible without hitting the Spitfires. The program controls the aim of the machine gun sights, and a flick of the joystick left or right fires the guns. Each Stuka hit earns 100 points, but there's a 300-point penalty for each downed Allied plane. Depending on the level of the challenge, between 5000 and 5800 saves the convoy.

Second is the Tiger Tank. *Desert Fox* campaigners must destroy five of these titans, the most lethal rolling armament in real campaign games. Damage from hits to the gamer's tank lights a status gauge across the bottom of the screen. When a German tank is destroyed, the radar in the lower left corner locates the position of the next enemy. The joystick turns the Sherman's cannon and steers shots after firing. This is a handy option, since the Tiger Tank's shells can be detonated after firing by a direct hit. At night, the campaign game gets tougher. Just seeing where the Tiger is becomes a major problem.

The Minefield is third. The gamer must steer through the minefield as quickly as feasible while avoiding mines. There are three ways to survive this obstacle course. The first is to steer around the mines, a tedious task that may eat up too much valuable time. The mines can be straddled, or blown up by the cannon. A mine only detonates when tank treads come in contact with one. The joystick controls both the speed of the tank and the side-to-side steering. Here's a strategy tip: If the Sherman sustains high damage on one of the other screens, go to the minefield and shoot out some mines. This will actually decrease the tank's damage level.

Ambush, the fourth phase, is unfortunately the most boring. It is a cousin of the old "trench" science fiction shootouts, with German mortars running along each side. Points are awarded for each mortar hit with machine gun fire. At night, however, this challenge is next to impossible, so avoid it at all costs.

Fifth is the Stuka. The joystick controls the machine gun sights and the radar helps locate the enemy. It is best to shoot down the planes when they're too far away to do damage to the Sherman, or after they've passed overhead and are moving away. Shots are steerable after firing, and five planes must be downed before the screen ends.

The campaign is played on a map of North Africa. The number of supply depots required to win varies with the five levels of play. The Allies lose the game if one of the depots fall into German hands or if the tank's damage indicator gets full.

There are four windows located beside the map. One supplies information on each depot (such as how much time until it falls under enemy control), another sends an air strike to buy time, the third intercepts enemy radio transmissions, and the last moves the tank. The only other thing on the map is the swastika which indicates Rommel's position. Never test the Korps Commander's firepower unless your Sherman is in top condition, with no damage. It takes eight direct hits on his tank to win, but that earns 8000 points and saves one depot.

Moving from depot to depot, saving them for the British flag, leads to the action screen encounters. Intercepting radio messages about German activities in a given direction helps figure out which screens are likely to come up.

There is little to complain about in *Desert Fox*, especially considering the price. The graphics are both attractive and functional. The practice feature makes it easy to fine-tune skills.

The skimpy documentation and lack of a "high score" list are the only drawbacks. The rule book has some nice drawings to help visualize the screens before turning on the computer, but several features are not covered, such as how to start the game over from the options screen (press f1).

Despite its minor shortcomings, *Desert Fox* is quite good. This well-executed contest is a compelling battle for action-strategy wargame enthusiasts.

Avantage/Accolade, 20813 Stevens Creek Blvd., Cupertino, CA 95014 (phone: 408-446-5757).

*–Rick Teverbaugh*

# COMAL COLUMN

## Microworlds in COMAL

### By Richard Herring

After an especially long stint at your computer keyboard you may feel that you live in a "micro" world. Today, I'd like to introduce you to another microworld – the one conceptualized by Seymour Papert (our professor of mathematics at MIT) as a solution to the problem of motivation in education.

Papert saw that learning is sometimes just a gradual process of resolving problems by formulating and testing simple solutions that resemble answers known to be "correct" for similar problems. Papert proposed microworlds as "task domains" or "problem spaces" to aid the learner. Learning in a microworld does not focus on the problem to be solved, but on some "neat phenomena" that are inherently interesting to watch and to play with.

If you ran the simple program we developed last month, you have already been a student in the microworld of increments. You were able to create several classes of designs based on different inputs to that program. Some of the designs produced startling spiral patterns or pretty variations of simple geometric shapes.

In that microworld, even a beginner can surprise a more expert user with the creation of a beautiful pattern. Those patterns, or "neat phenomena," became comprehensible by studying a set of only five variables. You could identify one variable as a dimension to examine and hold the others constant as the one you selected was varied incrementally.

We can start down the road to another microworld with a simple drawing program. Starting with the COMAL 0.14 listing below, you can draw on the graphics screen with a joystick in Port 2. First we set up by clearing the text screen (740) and setting the minimum distance for the turtle to move when you push the joystick (750-770). Then we turn on the multicolor graphics screen (800) and shrink the turtle to an unimposing size (810). Finally, we go into a loop (20-60) repeating the procedure "movement" to read the joystick. This loop repeats until 1=0, or forever.

```
0010 setup
0020 repeat
0030  movement
0060 until 1=0
0070 proc movement
0071  case peek(56320) of
0072  when 126
0073   d:=1
0074  when 118
0075   d:=2
0076  when 119
0077   d:=3
0078  when 117
0079   d:=4
0080  when 125
0081   d:=5
0082  when 121
0083   d:=6
0084  when 123
0085   d:=7
0086  when 122
0087   d:=8
0088  otherwise
0089   d:=0
0090  endcase
0095  if d then
0100   setheading ((d-1)*45)
0110   forward inc
0120  endif
0130 endproc movement
0730 proc setup
0740  print chr$(147) //  2.0=page
0750  print "how long should the turtle's"
0760  print "steps be (1-8)",
0770  input inc
0780  t:=1
0800  setgraphic 1 //  2.0=graphicscreen(1)
0810  turtlesize 6 //  2.0=turtlesize(6)
0820 endproc setup
```

To read the joystick, we examine memory location 56320. If that location holds a value for the joystick pushed in any of the eight possible directions, we turn the turtle that direction (100) and move him one step forward (110). I have introduced the CASE command here. Because it is such an important feature of COMAL, we'll spend the next column studying it rather than do it injustice here.

Now that's not much of a program. So we will kick into COMAL 2.0 and use its more advanced commands to add a little power. In "setup", let's replace line 780 and enable 2.0's turtle and joystick packages:

```
0780   USE turtle
0790   USE joysticks
```

Then let's use the first of those advanced commands – joystick – to replace lines 71 through 90:

Let's also add two calls to our unending REPEAT loop to

**Authorized** **COMB** **Liquidator**

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## SPECIAL NOTES

1) In the procedure "fill'a'space", we did not begin the fill at the turtle's actual location but at that location minus one. Why? If you moved the turtle to his current location without drawing a line (with the joystick button pressed) it would not matter. However, if you drew a line while moving the turtle, "fill" would try to fill that line. So we move off the line by one dot.

2) The joystick procedure in COMAL 2.0 is a real time saver. The command is structured:

```
joystick(portnumber, direction, button)
```

You must set "portnumber" to 1 or 2 (equivalent to memory locations 56321 and 56320 respectively). "Direction" returns a number equal to our D: variable in lines 71-90. And "button" returns the value one when the button is pushed or zero if it is not.

3) The COMAL 2.0 program we've developed can certainly be implemented in version 0.14. To allow turtle movement with the joystick button pushed, we would have to add a second value (equal to these shown minus 16) to each WHEN statement:

```
WHEN 126,110
```

You'd have to go around your elbow (i.e., more PEEKing) to do the "save'position" and "fill'a'space" procedures because version 0.14 does not support the functions "xcor", "ycor", or "heading".

And line 540, with that simple 2.0 circle command, will have to become a procedure in its own right.

4) We twice used the "moveto (x,y)" command to put the turtle back in his original position after drawing a circle or a line. We could just as easily have used the "setxy (x,y)" command. What's the difference? "Moveto" will never draw a line as it resets the turtle's position. "Setxy" would draw an unwanted line in our program (430,550) unless we preceded it with "penup" and followed it with "pendown".

5) Although I am tempted to keep playing with turtles and explore some Newtonian laws with a dynaturtle, I'll let that column slide until I hear from a few of you. In the meantime, two good references to turtles are:

*Turtle Sourcebook* by Jim Muller et al. from Reston contains computer-related activities for teachers, parents, and children.

*Every Kid's First Book of Robots and Computers* by David Thornburg from COMPUTE! Publications is an introductory level book that explores turtle geometry using either a Big Trak (Milton Bradley) robot vehicle (purchased separately/batteries not included) or turtle tiles (octagonal cardboard playing pieces that you rip out of the back of the book).

6) Papert did much of his work consistent with the thinking of Swiss philosopher/educator Jean Piaget who disputed the effectiveness and the ethical correctness of many modern educational practices. In *The Science of Education and the Psychology of the Child*, Piaget wrote:

> If we desire to form individuals capable of inventive thought and of helping the society of tomorrow to achieve progress, then it is clear that an education which is an active discovery of reality is superior to one that consists merely in providing the young with ready-made wills to will with and ready-made truths to know with.

use the procedures we are about to build:

```
0040    pen
0050    keyboard'check
```

Next we will add the procedure "pen" to lift the turtle's pen whenever the fire button is pressed. Note the variable "b" in this procedure is set by the "joystick" command in line 80.

```
0140 PROC pen
0150    IF b THEN
0160       penup
0170    ELSE
0180       pendown
0190    ENDIF
0200 ENDPROC pen
```

Finally, we will add seven more procedures: one to check the keyboard (210-290), a second to save the turtle's position if a key was struck (300-340), and five more to give us some artistic control.

```
0210 PROC keyboard'check
0220    sp$=KEY$
0230    IF sp$<>"" THEN save'position
0240    IF sp$="f" THEN fill'a'space
0250    IF sp$="c" THEN circle'draw
0260    IF sp$="d" THEN draw'a'line
0270    IF sp$="p" THEN color'of'line
0280    IF sp$="b" THEN background'color
0290 ENDPROC keyboard'check
0300 PROC save'position
0310    dl:=heading
0320    y:=ycor
0330    x:=xcor
0340 ENDPROC save'position
```

"Circle'draw" (460-570) lifts the turtle's pen (470) and lets you move him with the "movement" procedure (490) until you hit "c" a second time (500). It calculates how far you moved (530) even if you did not move the turtle in a straight line. Then it draws a circle with the original turtle position as the center (520-540), and puts the turtle back where he started (550-560).

The "draw'a'line" procedure (350-450) works just like "circle'draw" except that it draws a straight line between the initial and final turtle locations. This gives you the ability to draw a straight line that is not at one of the standard joy-

*Continued on page 61*

# AMIGA SECTION

## DELUXEPAINT II

**Electronic Arts**
**Price: $130.00**

*DeluxePaint* was one of the first packages available following the introduction of the Amiga 1000. Unlike most software issued early in the life cycle of a new machine, *DeluxePaint* was a full-featured and effective graphics package. In fact, *DeluxePaint* performed so well that in spite of several competing graphic products it became a best-seller among Amiga users. Although it did not have all of the features available with some other programs, *DeluxePaint* had the most comprehensive collection of features in a single package, with an effective user interface. In view of this brief and illustrious history, its successor became one of the most anticipated third party support products among the users of a single microcomputer. It is with great pleasure that we present *DeluxePaint II*.

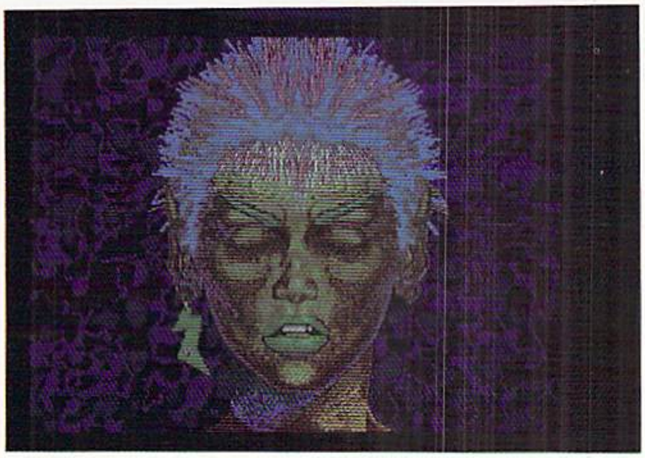
*DeluxePaint II* offers numerous enhancements to its predecessor. According to Electronic Arts there are over 50 new features, a figure we will not dispute. In addition, many of *DeluxePaint's* original operating modes have been improved in response to user suggestions. As a result *DeluxePaint II* is unquestionably the premier graphics package in its class for the Amiga.



**DeluxePaint II Sidebars**



Text and Photos by
Morton Kevelson



*Top: from the obviously warped imagination of Avril Harrison, a freakish cross between an alien and a punk rocker. Right: Deluxe Paint's programmer, Dan Silva. (Oops: sorry, Dan. Other way around.)*



*Morton the K, at play with* **DeluxePaint II's** *Perspective feature, goes berserk and comes down with a case of Infinite Tuts. We expect that Perspective will be one of* **DP II's** *most-used and least-understood features.*

### Overview

Computer graphics programs are designed for varying applications. *DeluxePaint II* is intended to simulate the traditional application of pigments to canvas for the creation of graphic images. In this mode the mouse becomes the painter's brush and the video display becomes the canvas. *DeluxePaint II* is not intended to be a CAD program, which you would use for creating engineering type drawings. However, it does have features which would lend themselves to CAD-type applications on a small scale.

Access to all of *DeluxePaint's* features is via the onscreen menus. Most of these features also have an alternative direct keyboard access. As you gain experience with *DeluxePaint* you will find the keyboard controls greatly speed up the access to many operations. In addition the keyboard controls are a tremendous convenience when the menu displays are turned off.

The menus are presented in two distinct flavors. Across the top is the traditional Amiga menu bar with drop-down menus and submenus. Most of the menu bar selections deal with system functions or major program operations such as file manipulation, printer control, and screen formats as well as color palette, brush control, and special effects. The right hand side of the screen normally displays an icon menu which deals with the various drawing or paint functions. These encompass a wide range of freehand and geometrical drawing tools including paint selection from the current palette.

A quick scan of the icon menu reveals a selection of built-in brushes at the top. These standard solid shapes may be enlarged to fill the screen using the keyboard controls. Freehand

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drawing may be either continuous or dotted. Drawing in continuous mode may cause the image to lag behind the cursor position with the larger brushes. The image always keeps up with the cursor in dotted mode; in this case the spacing of successive brush images is varied with the speed of the cursor's movement.

Supported geometrics include straight and variable curved lines, filled and unfilled rectangles, circles, ellipses, and polygons. Other tools let you generate an airbrush effect or fill screen areas with a block of color. There is also a handy undo icon which cancels the most recent paint action as performed by a mouse click, and of course a clear icon which fills the screen with the current background color.

Foreground color may be selected by simply clicking on any of the palette colors with the left mouse button. The background color is picked with a click of the right mouse button. The current foreground and background colors are displayed in a box directly above the palette. The current color display box also serves two other functions. Clicking in it with the left button lets you pick the foreground color directly from the canvas. This comes in handy when matching a color from a range of closely related colors. *DeluxePaint* lets you use up to 32 colors from the Amiga's palette of 4096. Clicking the color display box with the right mouse button brings up the Color Palette requestor as shown in the screen photograph on page 58. Note that the Color Palette requestor may also be invoked from the top menu or the keyboard.

The color palette requestor plays an important part in *DeluxePaint's* scheme of things. It is from here that refined color selection (from the available 4096 hues) is accomplished. Settings are made via calibrated Red, Green, and Blue (RGB) sliders or via Hue, Saturation, and Value (HSV) sliders. The spread option lets you easily create ranges of related colors. The power and control over color of this system is well illustrated by the tutorial section of the *DeluxePaint* manual.

The Color Palette requestor also includes the facilities for marking up to four cycle ranges (Cl to C4) with individual speed control and direction. The cycle ranges represent one of *DeluxePaint's* most dramatic features. By automatically cycling through a range of colors it is possible to create a multitude of animation effects which are visually astonishing. These effects (which are impossible to reproduce in a magazine) are well-illustrated by several sample images supplied with *DeluxePaint*, and by the tutorial section of its manual.

For very precise pixel control you will make use of the magnify and zoom icons. When magnify is invoked the enlarged image as well as the original are displayed side by side. The zoom feature lets you apply variable magnification. The zoom range is wide enough to satisfy all requirements.

The most powerful basic *DeluxePaint* feature is the brush function. Its icon is simply four corner sections of a square, reminiscent of the paste-down corners which hold photographs in albums. This tool allows any part of an image to become a brush. Once a brush is selected, all the standard drawing functions can be used with it. In addition brushes may be manipulated in many ways. They can be flipped, rotated through any angle, bent, and warped. Brushes may be loaded and saved as separate entities and carry their own color palette which may be used or matched to the existing palette. Brushes are also a key element of *DeluxePaint's* new perspective feature.

This just about sums up the basic features common to both versions of *DeluxePaint*. We will now take a close look at some of the new capabilities included with *DeluxePaint II*.

**Fills**

*DeluxePaint II* is not limited to solid color fills. Areas of the canvas may now be filled with any pattern you choose. In fact anything can be a pattern, as patterns are derived directly

**_DeluxePaint II_ Main Menu Chart**

The top menu selections of *DeluxePaint II* provide a good overview of the program's capabilities. The number of available selections also makes a menu chart a useful accessory. As the manual does not contain such a chart we have decided to provide one for you. Note that only the first level menu selections have been shown. Many menu selections will bring up submenus. We have indicated these with an asterisk (*). Other selections will generate requestors. These have been marked with a plus (+).

**_DELUXEPAINT II_ TOP MENU**

| Picture | Brush | Mode | Effects | Fonts | Prefs |
|---|---|---|---|---|---|
| Load+ | Load+ | Matte | Stencil* | Style* | Coords |
| Save+ | Save+ | Color | Background* | Load Font Dir | Fast FB |
| Delete+ | Delete+ | Replc | Perspective* | | Multicycle |
| Print+ | Size* | Smear | | | Be Square |
| Color Control* | Flip* | Shade | | | Workbench |
| Spare* | Rotate | Blend | | | ExclBrush |
| Page Size+ | Change Color* | Cycle | | | |
| Show Page | Bend | Smooth | | | |
| Screen Format+ | Handle* | | | | |
| About | | | | | |
| Quit | | | | | |

from the current brush.

Gradient fills are now supported as well. To use this you must first select a range of colors to be used for the fill, then select one of these colors as the current foreground color. The Fill Type requestor offers three types of gradient fills. Horizontal and Vertical fills generate a uniform spread of shades. The Horizontal Line fill adjusts the fill gradient to accommodate the shape of the image. For example, using the Horizontal Line in a circle will result in a very spherical looking image.

The appearance of the fill is set with the Dither tool. Fill patterns range from a spread of uniform color bars to a randomized pattern which gradually intermingles the colors. The Fill Type requestor provides a small preview of the fill pattern which will be generated. A smaller view of the fill pattern also appears on the top menu bar when Fill Mode is active.

Finally keep in mind that gradient fills will provide instant animation with color cycling. The gradient-filled sphere mentioned above generates very realistic rotational motion when color cycled.

### Backgrounds, Foregrounds, Stencils

The terms background and foreground take on new meaning in *DeluxePaint II.* An entire image may be defined as a background at any time. Doing so permits you to paint over the image and restore its original appearance by simply clearing to the background. In a similar fashion you may create stencils or friskits by locking foreground colors. Since the selected colors cannot be painted over, you may easily modify selected areas of the image. The combination of a fixed background with a stenciled foreground is

### Screen Format versus Page Format

The original *DeluxePaint* supported three of the Amiga's screen formats. However, you had to reboot the program to switch from one format to another. Furthermore, if you tried to load a non-compatible format, *DeluxePaint* would merely protect without providing any useful information. *DeluxePaint II* has successfully addressed all of these problems as well as providing additional screen format options.

*DeluxePaint II* now supports all the Amiga's standard screen formats as well as a non-standard full page format. The latter, for use with a suitable slide show, will fill the entire video display screen. This should gladden the hearts and souls of all the videotapers in our readership. Here is a list of the *DeluxePaint II* screen formats:

| | |
|---|---|
| Lo-Res | 320 × 200 pixels<br>32 colors |
| Med-Res | 640 × 200 pixels<br>16 colors |
| Interlace | 320 × 400 pixels<br>32 colors |
| Hi-Res | 640 × 400 pixels<br>16 colors |

The number of colors represents the maximum number of bit planes available for that mode. Five bit planes are required for 32 colors, with only four bit planes used for 16 colors. *DeluxePaint II* will also support fewer than the maximum number of bit planes. A reduction of one bit plane divides the number of available colors by two. Thus a single bit plane will only support two colors.

*DeluxePaint II* also supports a wide variety of page formats. The distinction between page and screen formats is an important one. The page format is the dimensions, in pixels, of your drawing canvas. The screen format is the dimensions, in pixels, of the video display area. *DeluxePaint II* actually supports page formats up 1008 by 1024 pixels!

Furthermore, even the largest page formats may be used with any screen format in *DeluxePaint II.* We were even able to load up a hi-res, four bit plane image into a lo-res screen display. The program, after notifying us of the pending incompatibility via a suitable requestor, automatically adjusted the number of bit planes and the dimensions of the screen page to accommodate the image. Of course only one fourth of the image was displayed on the lo-res screen, but we were able to edit any part of the page by scrolling about with cursor keys.

*DeluxePaint* lets you change both screen format and page format at any time. Both selections are available on the main menu. Some format changes may result in a loss of image data. If this may occur a suitable warning is displayed. Just be sure to save your work before changing the screen format.

### Memory Requirements

*DeluxePaint II* requires an Amiga with a minimum of 512K RAM to operate. The program itself occupies 200K and Intuition requires 100K with 20K for an external disk drive. The graphic displays require substantial memory. The lo-res, 320 × 200 pixel display uses 8K for each bit plane or 40K for a five bit plane (32 color) display. Thus a 512K Amiga will be able to handle lo-res operation with all of *DeluxePaint II's* features, including the spare page and brushes.

Hi-res operation starts to run up against memory limitations. A 640 × 400 pixel bit plane uses 32K RAM. A 16 color, 4 bit plane display needs 128K. It is apparent that all of *DeluxePaint II's* features will not be available with hi-res graphics on a 512K system.

There are several ways to manage memory on the Amiga with *DeluxePaint II.* The program may be instructed not to load all its functions into RAM at once. This will slow up some operations, as the program modules are loaded in as needed. External RAM expansion offers some relief, as parts of the program may be located outside of chip RAM. Note that graphics requires the use of chip RAM. To conserve memory *DeluxePaint II* normally turns off *Workbench.*

At the extreme end of the graphic memory requirements we find that a 1008 by 1024 pixel bit plane requires 126K RAM. Using all possible memory conservation and an Amiga equipped with a C Ltd. aMega external RAM expansion module (total of 1.5M RAM), we were only able to use a two bit plane, four color graphics page with these dimensions.

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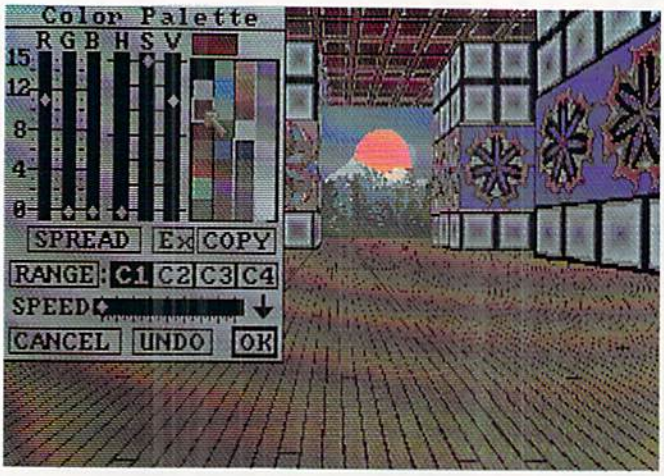
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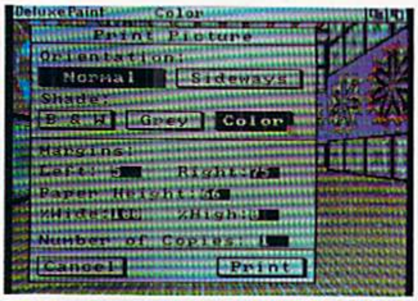
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*Left: Color Palette requestor provides color control and four cycle ranges. Bottom: Print Picture requestor offering printer control, and Load Picture requestor.*

a very powerful technique for enhancing an image.

As with all high level *DeluxePaint* features, there is a Make Stencil requestor specifically designed for this purpose. This requestor facilitates the color selection associated with stencils. The application and implementation of *DeluxePaint* stencils is amply illustrated by a dedicated tutorial section.

**Perspective**

Perhaps the most innovative feature in *DeluxePaint II* is its Perspective capabilities. We predict that Perspective will be one of the most used and least understood features of this package. We expect to see some fascinating images generated with this tool. We also anticipate much discussion on the subject as more users get involved with it. In fact, the subject of Perspective merits an entire discussion of its own. We will not present such a discussion at this time as we do not have the space and we have not yet discovered all the ramifications of this feature.

In brief, Perspective in *DeluxePaint II* involves the manipulation of a two-dimensional object (a custom brush) through a three-dimensional space and displaying the result on a two-dimensional canvas. You start by defining a custom brush. With brush in hand you enter perspective mode, set your point of view, rotate the brush into position, and proceed to lay down copies of the brush. The process is easy to implement but difficult to comprehend.

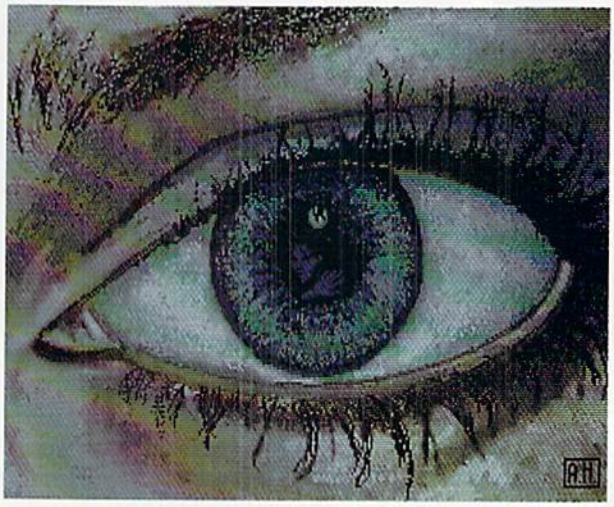
In Perspective mode all mouse movement represents movement along the X and Y axes of the brush. The default position for the brush axes lies in the plane of the canvas. The X axis of the canvas is left to right. The Y axis is up and down and the Z axis is perpendicular to the surface of the viewing screen. If the brush is now rotated about its X or Y axis we effectively tilt the brush out of the plane of the picture. Mouse movements now generate a component of brush motion towards or away from the viewer. These movements are translated to a change in the apparent size of the brush as it appears on the canvas.

In use the brush is represented by a blank outline with cross hairs which changes its size and orientation as it is moved. Clicking the mouse button lays down a perspective representation of the brush. This can take some time, depending on the size of the brush and the number of bit planes, as the location of each pixel has to be calculated.

The entire process sounds much more imposing than the actual practice. The manual includes a lengthy tutorial section on the Perspective feature, which illustrates many of the operations. However, the manual's description of this topic leaves something to be desired. The problem is largely that the explanation is purely textual without any supporting diagrams.

Fills may also be executed using the Perspective feature. The results can be striking, offering considerable return for minimal effort. With Perspective you have the option of employing anti-aliasing. This reduces the "jaggies" or staircasing effect of diagonal lines. The penalty is additional calculation time when laying down a brush. Anti-aliasing reduces the "jaggies" by filling in the gaps in the staircase with pixels whose color is an average between the

*A close look at* **DeluxePaint II** *reveals more than fifty enhancements to its predecessor. In addition, many of the program's original operating modes have been improved in response to user suggestions. Image shown is* **Eye** *by Avril Harrison.*



colors of the adjacent areas. This fools the eye into smoothing out the irregularities of the sloped line.

**Printer Control**

*DeluxePaint II's* screen dump facility now provides nearly all the controls available on the Amiga's Preferences tool. The only control missing is the ability to set the threshold for a black and white dump. In addition, *DeluxePaint II* lets you choose between vertical or horizontal printouts and control the aspect ratio of the final printout. This last feature is not available on the Preferences tool.

**The Manual**

The original *DeluxePaint* manual has been the source of many complaints. The manual which accompanies *DeluxePaint II* is a substantial improvement. It is now broken up into four major sections which total over 100 pages. The first two chapters introduce the program and its basic operations. The third chapter is a series of tutorials on the more complex features of the package. We have mentioned some of these tutorials above. The fourth chapter is a detailed reference section for the entire package.

The manual is a good place to get started with *DeluxePaint II.* However, do not count on it as the final word on the use of this package. There are many program features which are still given inadequate treatment. The best way to really get to know *DeluxePaint II* is still to dive right in and use it.

**Conclusion**

*DeluxePaint II* does an excellent job of showing us just what the Amiga can do. Most, if not all, of the valid suggestions made by users of the previous version have been implemented. Many additional enhancements have been made as well. In fact there are so many new and powerful features that we have not yet recovered sufficiently from feature shock to ask for more.

Note that *DeluxePaint II* uses the key disk copy protection system. You may copy the original and boot from the copy; however, the original disk must be present for a brief interval during the booting process. The package includes a coupon which will let you purchase an unprotected backup for an additional $20. Owners of *DeluxePaint* may upgrade their package for $30 plus $7 shipping. If you already have the unprotected version of *DeluxePaint*, there will be no additional charge for the unprotected *DeluxePaint II.*

Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404 (phone: 415-571-7171). *–Morton Kevelson*

*The range of* **DeluxePaint II's** *magnify and zoom feature is illustrated with* **Waif** *by Avril Harrison. If magnification is invoked, the original and enlarged images are displayed side by side.*







# COMAL COLUMN

*Continued from page 52*

stick 45 degree angles. The procedure "fill'a'space" (580-600) will color an enclosed area with the current pen color.

```
0350 PROC draw'a'line
0360   penup
0370   LOOP
0380     movement
0390     EXIT WHEN KEY$="d"
0400   ENDLOOP
0410   pendown
0420   drawto(x,y)
0430   moveto(x,y)
0440   setheading(dl)
0450 ENDPROC draw'a'line
0460 PROC circle'draw
0470   penup
0480   LOOP
0490     movement
0500     EXIT WHEN KEY$="c"
0510   ENDLOOP
0520   pendown
0530   rad:=SQR((y-ycor)^2+(x-xcor)^2)
0540   circle(x,y,rad)
0550   moveto(x,y)
0560   setheading(dl)
0570 ENDPROC circle'draw
0580 PROC fill'a'space
0590   fill(xcor-1,ycor-1)
0600 ENDPROC fill'a'space
```

The procedure "color'of'line" (610-660) increments the turtle's pencolor. First it checks the current color with the "inq" command. With "inq(#)" you can get information on 34 different graphics variables from screen colors to graphics text. Line 640 prevents the pencolor [inq(6)] from being the same as the background color [inq(5)]. Line 630 limits us to the maximum 16 colors (0-15). The "background'color" procedure (670-720) works just like "color'of'line."

```
0610 PROC color'of'line
0620   p:=inq(6)+1
0630   IF p>15 THEN p:=0
0640   IF p=inq(5) THEN p:=p+1
0650   pencolor(p)
0660 ENDPROC color'of'line
0670 PROC background'color
0680   b:=inq(5)+1
0690   IF b>15 THEN b:=0
0700   IF b=inq(6) THEN b:=b+1
0710   background(b)
0720 ENDPROC background'color
```

Well, now we have a decent little joystick drawing program with only 82 lines of COMAL. Not bad. But it's still not a good microworld and that's what we're after. You might use the existing program to put some blue water at the bottom of the screen, then a white sandy beach, then a road and even a few buildings before you hit sky. Sort of a 45 degree aerial view. But forget drawing a man or a car on that background with a joystick.

If you want a real microworld to explore, you'll just need to add some COMAL procedures. Here's how you can create a microworld to let young children learn to spell. Insert a new line into "keyboard'check":

```
285 IF sp$="*" THEN draw'object
```

Then add a new procedure to toggle to the text screen, ask the child to type the name of the object he or she wants, and call a procedure to draw that object. You can have as many procedures to draw objects as you like.

```
PROC draw'object
  textscreen
  PRINT
  PRINT "What do you want the turtle"
  PRINT "to draw",
  INPUT name$
  CASE name of
  WHEN "man"
    man
  WHEN "car"
    car
  OTHERWISE
    PRINT "Sorry, I don't know that
          word."
    wait
  ENDCASE
  fullscreen
ENDPROC draw'object

PROC wait
  FOR w:= 1 to 2000 DO
    null
  ENDFOR w
ENDPROC wait

PROC man
  design your own
ENDPROC man

PROC car
  design your own
ENDPROC car
```

You may have noticed that we're limited to nouns as procedures. What if you want to include verbs for motion? Using sprites to draw the objects, you could introduce objects that move in straight lines or patterns beginning at the current turtle position and in the direction the turtle is heading. Since we are just starting out, I will leave the whole topic of sprites to a future column.

Questions? Comments. Tirades! Write me directly at P.O. Box 1544, Tallahassee, Florida 32302. □

# SCAVENGER HUNT

## For the C-64

### By Bob Blackmer

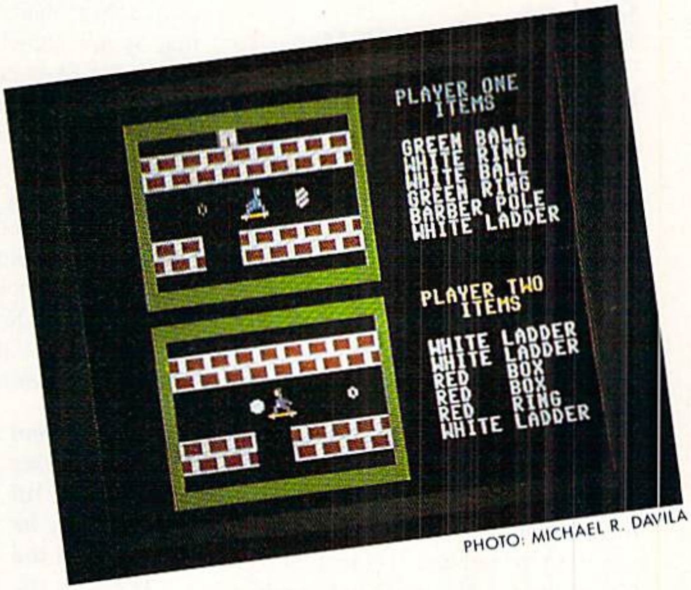



PHOTO: MICHAEL R. DAVILA

*Scavenger Hunt* is a full-blown two-player arcade game for the C-64. It features two multicolor scrolling game windows (one for each player), multicolor sprites, and energetic theme music utilizing all three voices. Through the use of interrupts, smooth scrolling of the windows and the playing of background music is performed without hesitation. The object of the game is to find all the items on your list and return home.

The playing field consists of nine streets, each filled with various objects and one white house randomly located. The computer will then select six items for each player to obtain. Since the playfield is much bigger than the screen, I thought it only fair to supply a conveyance that will get you around quickly. As you ride around on your skateboard, keep a lookout for the objects on your list. When you see one, stop over it and press the fire button. The item will disappear from your list and the street. (Sometimes, right under the nose of the other player.) After getting all of your items, you must find your way to the white house and press the fire button.

The first time you play the game, just ride around and get to know the layout of the playfield. Check and see what the thirteen objects in the game look like. There are ladders, boxes, balls, and rings in colors of red, green, and white, and a barber pole. (I don't know. I wanted thirteen objects, and it was easy to make.) The objects are selected randomly, and I purposely left open the possibility of repeat items. I found it can make for some interesting scenarios.

There are many strategies to use in this game. Make a mental note of the location of the white house if you come across it as you gather items. Memorize the first few items and get those first. Glance occasionally at your opponent's list, to see how he is doing. Scavenge in the same area as the other player, taking like items before he can. If the objects on your list are mostly one color, then go and attack that color—you'll get ahead fast. Add with this some fancy skateboarding and you may find a way to win *Scavenger Hunt*.

I realize the program requires a bit more typing than I usually ask of you, but I'm sure you'll find it worth the effort. I'm confident you'll be playing this regularly.

*Scavenger Hunt* is written entirely in machine language and must be entered using *Flankspeed* (see page 85). After typing in and saving SCAVENGER HUNT, reset the computer and LOAD "SCAVENGER HUNT",8,1. Then SYS 49152 to start. ☐

*SEE PROGRAM LISTING ON PAGE 91*

## CYBER VIDEO
**Touchstone**
**C-64**
**Price: $39.95 (Demo Disk $5)**

When Commodore designed the C-64 they intended it to be more than a cut-and-dried eight bit computing machine. By endowing the C-64 with advanced graphic and sound hardware. Commodore made it a fun machine as well. In fact the SID and VIC chips still represent the most advanced sound and graphics devices supplied with any eight bit microcomputer to date. As a result it comes as no surprise that software which exploits these capabilities has grabbed the lion's share of the C-64's software market.

*Cyber Video* from Touchstone is a music, graphics, and animation package intended to place you in total control of the C-64's sound and graphics facilities. To our knowledge it is the only package which combines complete control of the SID chip with hi-res, 320 by 200 bit mapped graphics, sprite control, and text manipulation.

*Cyber Video* is a collection of three integrated program modules. The first of these lets you integrate music and sound effects into unique SID chip symphonies. The second module is primarily a hi-res bit map drawing program which includes built-in sprite manipulation with some rather interesting pseudoanimation effects thrown in for good measure. The third module lets you orchestrate what you've created with the first two modules into a feature-length production.

### The Input Device

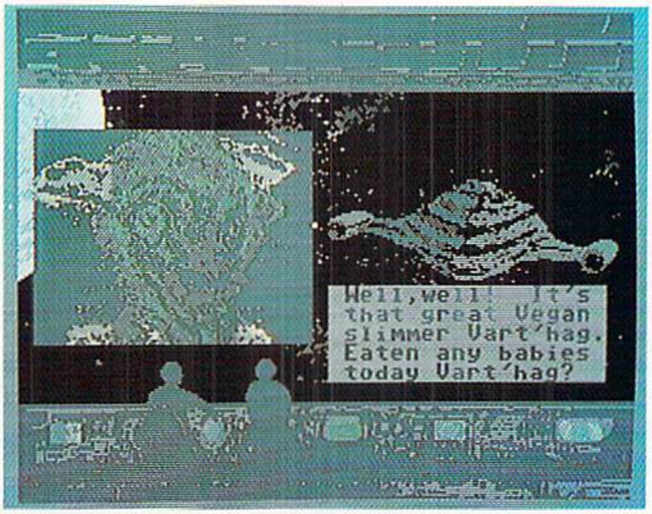
The feel and operation of a graphics package is largely dependent on the input device. Our version of *Cyber Video* supports the Koala Pad and the Commodore 1350 mouse. Touchstone is currently working on an input driver for the Commodore 1351 mouse as well. It is important to recognize the distinction between the 1350 and the 1351. The former is a digital controller similar to a joystick. The latter is a proportional controller similar to a pair of paddles. We did most of the work on *Cyber Video* with the Koala Pad and we will base our review on that device. Note that a trackball or joystick may be substituted for the 1351 mouse.

Judging from our *Art Gallery* submissions, the Koala Pad is the most popular graphic input device for the C-64. In spite of its popularity there has been virtually no third party support for it. In fact, to our knowledge Touchstone is the only developer other than Koala Technologies supporting the device. Existing Koala Pad owners will be glad to know that Touchstone has done an excellent job of integrating the Koala Pad into their software. Unfortunately, Koala Technologies is no longer manufacturing or marketing the Koala Pad, so new users may have some difficulty locating the device.

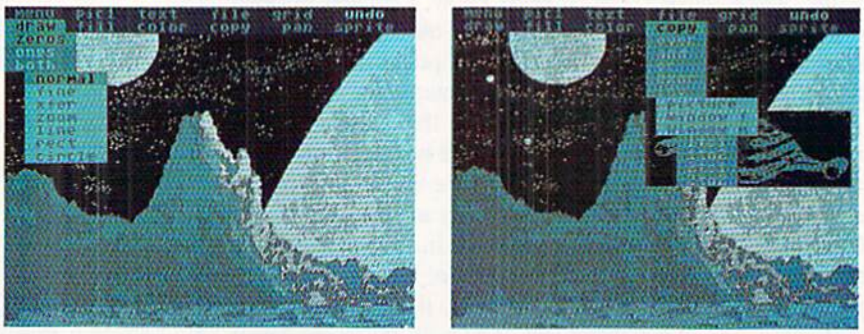
*Cyber Video* is entirely menu driven. Each program module has its own set of menus across the top of the screen. To access a command simply place the cursor on it and click a button. Many functions require additional input for their completion. In these cases a submenu will appear when the command is activated. Some functions, such as file manipulation, generate their own work screens.

The *Cyber Video* drawing canvas uses the C-64's hi-res bit map, which consists of 320 by 200 pixels. The Koala Pad, as a proportional controller, is only able to generate 256 values. This is insufficient to span the entire width of the bit map screen. To get around this limitation, Touchstone has actually compacted the effective range of the Koala Pad. When you are sketching, movement across the Koala Pad translates to only a small portion of the screen width. The *Cyber Video* input algorithms actually make the Koala Pad's range velocity dependent. The faster you move the stylus the shorter the corresponding cursor movement

*A scene from the adventures of Captain Val Spinoza, as he encounters the Vegan nasty, Vart'hag. This space parody, included on the* Cyber Video *demo disk, contains some excellent sound and graphics. READER SERVICE NO. 175*




PHOTOS: MORTON KEVELSON



*Sample screens from* Cyber Video's *graphic module showing pull-down menus.*

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across the screen. The effect enhances the precision of the Koala Pad. In fact we found that the Koala Pad handled better with *Cyber Video* than with the *Koala Painter* program for which it was originally intended.

To extend the working range of the pad, *Cyber Video* maintains the current cursor position when you lift the stylus. Thus, to continue drawing when you reach the edge of the pad, you need only lift the stylus and reposition it. Even greater precision of movement may be had in the graphics module by activating the Fine mode in the graphics menu.

Additional control is implemented with the two Koala Pad push buttons. Most functions are implemented by a click of either button. For some activities the left and right buttons attain unique significance. The current onscreen menu is always activated by clicking a button without any pressure on the pad's surface. In terms of action, the 1350 mouse, a trackball, and a joystick differ primarily in the use of their single active push button. In this case the function of the second push button has been assigned to f7 on the keyboard. Since these devices also lack a state which corresponds to the pad's no pressure condition, the menu activation has been assigned to a rapid double click of the fire button.

### The File System

Each of *Cyber Video's* program modules maintains its own data files. File names are automatically prefixed with an identifying letter when you save the data. For example, sound files will all start with an "S". *Cyber Video's* wide variety of data file types makes an organized filing system a necessity. For example, the graphics system will create separate files for full bit maps or pictures, windows, and sprites.

Graphics data is compressed before it is saved to disk. This saves disk space and speeds up loading times, important considerations for an animation package. The latest release of *Cyber Video* also includes a built-in fast loader for additional disk speed. The fast loader may be bypassed if your disk



drive will not work with it.

### Cyber Music

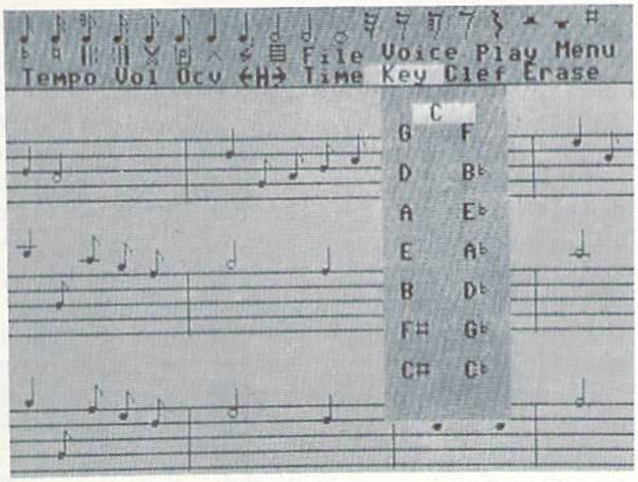
The music module of *Cyber Video* lets you create sound tracks using nearly standard music notation. As can be seen from the accompanying screen photograph, Cyber Music supports the full range of note and rest durations down to 1/32 notes and including triplets or ⅓ notes. The only deviation from standard notation is in the function of ties or slurs. These act as toggles on the Cyber Music staff turning the tie function on or off.

The Cyber Music screen is composed of three staves, one for each of the SID chip's voices. Each staff has a range of two octaves and you may change octave range at any time. *Cyber Video's* total tonal range spans seven octaves. All standard keys and time signatures are supported and these may be changed in mid-composition too.

Writing music with Cyber Music is simplicity in itself. Just pick up a note or other symbols from the onscreen menu and place it on the staff. Our only real cause for complaint with this arrangement was that each note could only be used once. If you wanted to repeat a note you had to go back to the menu for another one. The staff has to be scrolled manually while entering music. It may be advanced by a single character or by an entire screen. Automatic scrolling is implemented during playback; however, the screen display almost always lags behind the music.

As with any good music package, Cyber Music lets you create your own instruments. The program has a built-in selection of 25 instruments and sounds. All of these may be modified, or you may create instruments from scratch. Voice files may be saved to disk for future recall. Cyber Music's voice editor provides for selection of waveform, the setting of the sound envelope's attack, decay, sustain, and release parameters, and the adjustment of the SID chip's filters.

Cyber Music also supports special effects for those occasions when dissonance is more desirable than harmony. The special effects screen lets you fool with slide phenomena, as well




*Composing with* **Cyber Video** *is as easy as picking a note or other symbol from the on-screen menu and placing it on one of the three staves (one for each of the SID chip's three voices).*

as providing access to the SID chip's RING and SYNC modulation abilities.

Overall Cyber Music has sufficient features to allow it to serve well as a stand-alone music package.

**Cyber Graphics**

*Cyber Video's* graphic module also has sufficient features to qualify it as a stand-alone graphics program. It is also one of the few drawing programs which utilize the C-64's hi-res bit map mode in 320 by 200 pixel format. The design of the VIC chip limits the display to two colors in each eight by eight pixel character cell when in hi-res mode. Note that any of the C-64's sixteen colors may be used in any combination anywhere on the screen within the above limitation. By comparison the alternative multicolor display mode has half the horizontal resolution, but allows up to three unique colors and a screen background color in each character cell. This greater color flexibility has made the multicolor mode more popular among developers of graphics packages.

Cyber Graphics supports freehand sketching as well as automatic line drawing, creation of rectangular shapes, and true circles. Some users may be puzzled by the Cyber Graphics drawing nomenclature. The menus refer to drawing with zeros, ones, or both. This refers to the state of the memory bits which correspond to the visible pixels. If you find the binary nomenclature disturbing you might think of the zeros as background and the ones as foreground. Strictly speaking the hi-res bit map does not have a background or foreground. When drawing with both, *Cyber Video* generates a checkerboard pattern on the pixel level.

There are actually three bit maps used by Cyber Graphics. Two of these are directly accessible by the user. The third is used for special functions such as the built-in Undo command which actually lets you save the current state of the screen or restore a previously saved state. By comparison, Undo functions on most other graphics programs cancel the most recent graphic operation.

All three screens are also used for the Pan command. This provides horizontal scrolling across the width of two bit maps. The scroll may be stopped at any time and the current screen position saved as a separate picture.

Cyber Graphics provides extensive bit map copy functions. Sections of the bit map may be copied to the same screen or the alternate in several different ways. Windows, or sections of the bit map, may be defined and saved as separate entities. Windows are used extensively as graphic overlays by the animation module. Once again, Cyber Graphics resorts to digital terminology in order to describe the various copy functions.

The copy modes include image Overlay, Inversion (creates a photo negative), And, Or, and Exclusive Or. The And mode can be thought of as "both" mode, as only corresponding pixels which are both in the one state will remain as ones. The Or mode may be considered a transparent overlay. The Exclusive Or function can be thought of as a test mode in that two successive operations will restore the orig-

## READER SERVICE INDEX



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inal image. This full range of copy functions is used for the various pseudoanimation effects in the Animation Module.

As with other hi-res packages, Cyber Graphics handles color in its own unique way. You select the foreground and background color (zeros and ones) to operate on a character cell, window, or screen. Note that erasing a screen consists of two operations. First the screen must be filled with zeros (or ones), then filled with a single color.

Cyber Graphics has a built-in sprite editor. Up to seven sprites may be created with each work screen. Sprites may be linked together and positioned on the screen. Parts of the main bit map may also be copied into a sprite.

The current version of *Cyber Video* includes a simple conversion program to transfer images in the popular *DOODLE!* format into Cyber Graphics format. This will let you make use of any existing hi-res graphics libraries in your possession. The conversion program works in both directions, changing Cyber Graphics pictures into *DOODLE!* format.

### Cyber Animation

This is where all the graphics and music come together. At its simplest level, Cyber Animation can serve as a sophisticated slide show. However, it is really far more than that. Built into Cyber Animation is the equivalent of an animation programming language. Its commands are most of the menu commands from Cyber Music and Cyber Graphics. These are supplemented by the commands which control timing, loops, and text display. The text part of Cyber Animation is not the same as the text command of Cyber Graphics. In the former, text actually becomes part of the animation command file. In the latter, the text becomes part of the bit mapped image.

Cyber Animation contains the facilities for creating, editing, and previewing the animation lists. However, there are some serious shortcomings to these facilities. At present you will require a good feel for the capabilities of the animation module to use it effectively. Once an animation list is created you can step forward through it, but there is no means to back up. This makes it awkward to find a sequence of commands if you can't remember exactly where they are. Some information cannot be redisplayed once it is entered into the animation list. For example, file names associated with a load instruction seem to disappear forever.

The most obvious solution to this problem is to provide a facility for printing out an animation list. This would permit independent analysis outside of the computer. At present there is no printer support provided for any of *Cyber Video's* program modules.

On the other hand, Cyber Animation is surprisingly easy to use. A small amount of practice with it will take you a long way up its learning curve. The demo disk which accompanies *Cyber Video* contains numerous sample files along with the run time modules. These files supplement the information contained in the manual.

### Documentation

*Cyber Video* comes with a well-written manual of over 90 pages. More than half is devoted to Cyber Music, including a lengthy introduction, a section on music, and a reference section. The remainder of the manual is equally divided between the graphics and animation sections. The manual is accompanied by several loose pages which explain the latest updates.

### Conclusions

*Cyber Video's* sound and graphics modules are notable utilities in their own right. The real power of *Cyber Video* comes from the unification of all its components. Based on what we have seen, *Cyber Video* can produce very effective results. You don't have to take our word for this. For $5 you can order the Touchstone demo disk. This demo, which runs for about 20 minutes, highlights many of *Cyber Video's* features. It also contains an introductory episode of the adventures of Captain Val Spinoza of the Federation's Fixer League. This tongue-in-cheek parody contains some excellent graphics and sound and is alone worth the price of the demo. If you like what you see, simply pay the balance and you will have the chance to complete Captain Spinoza's adventure on your own. If you don't like what you get, Touchstone offers an

unconditional money back guarantee on its product.

*Cyber Video* is protected against unauthorized distribution by a security key or dongle which plugs into the joystick port. Note that the run time module does not require the security key for its use. This permits you to send your disk-based dissertations to your family and friends.

Touchstone, P.O. Box 1378, Couer d'Alene, ID 83814 (phone: 208-667-9290). *—Morton Kevelson*

**SIXTH SENSE 128**
**Prism Software**
**Commodore 128**
**Disk; $49.95**

*Sixth Sense 128,* a terminal program that runs on the C-128 in 80-column 128 mode, is the best communications package that I've seen for the C-128. While it is easy to use via pull-down menus, it also accepts direct commands for those who like the quicker operation that such commands afford. The user decides which command entry system is appropriate for him. The on-line help feature makes it even easier for beginners to learn how to use the program.

*Sixth Sense 128* works with most of the popular modems available for the Commodore 128, including the Commodore 1600, 1650, 1660, and 1670, the Westridge, Mitey Mo, Hayes and compatibles (Volks 6420 and 1200), and RS-232 modems attached with the RS-232 interface. For this review, I used the Volks 1200. If the modem in use supports auto-answer and auto-dial, then *Sixth Sense 128* will enable these features.

The dialing functions are very well done, offering auto-dial, auto-answer, redial, and a dial list command. The dial list command cycles through a list of phone numbers, dialing each in turn until a carrier is detected. The list can include numbers longer than 11 digits, so you can include calling card or other dialing information. Both tone and pulse dialing are supported.

*Sixth Sense 128* supports XMODEM and CompuServe "B" file transfer protocols. These two popular protocols help insure that time spent down- and up-loading is not wasted. If you are communicating with a computer that

can't use these protocols, you can use *Sixth Sense 128's* buffer dump and buffer save. Buffer capture is best used only with text files. The buffer holds 800 lines of 80 column text with a normal 128K C-128. If you add the 512K memory expansion module, the buffer size goes up to 7200 lines.

### Your Viewing Pleasure

As *Sixth Sense* does not have a 40-column version, a good monitor is highly recommended. On a television screen the output would probably be illegible.

The screen color adjustments are almost a necessity. The default colors, black letters on a white screen, were very uncomfortable for me. Others may find this acceptable, but I was constantly squinting to cut the glare. Switching to white letters on a black screen made the text much easier to read.

The color controls aren't very useful unless you are using an RGBI monitor, since this is the only type that offers true color output. Composite monitors (like the Amiga 1080 that I was using) can only be used in monochrome mode.

### Disk Options

*Sixth Sense 128* is designed to work with Commodore 1541, 1571, and 4040 disk drives, as well as MSD SD-1 and SD-2. It allows you to load, save, and scratch files (SEQ or PRG). Files can be edited without leaving the program, or they can be written to disk as they are received through the modem. With this feature, you open the disk file before you start to receive data from the remote computer. Instead of buffering the information in memory, the data is written straight to disk. This simplifies acceptance of longer files.

The commands to view disk directories are quite flexible. If you are in a hurry, you can specify sequential files or program files only for the listing. You can easily send the output to a printer as well.

### Other Features

One feature that surprised me was the macro-capability. Like other programs that offer this feature, it allows you to assign multiple-keystroke commands to single keys for easy access. The amazing part, though, is the flexibility of programmable functions. Commands can include "wait time," "wait newline," "when $ do," "when time do," "when line do," and "when counter do." You can have 20 macros set up at a time.

**Sixth Sense 128 Terminal Parameters**

| | |
|---|---|
| Baud Rate | 50, 110, 150, 300, 600, 1200, 2400 |
| Parity | no, odd, even, mark, space |
| Stop bits | one, two |
| Word Length | five, six, seven, eight |
| Duplex | full, half, offline half |

Another convenience feature that I really enjoyed was the split-screen mode. When this is turned on, a "write window" appears at the bottom of the screen. Any characters you type are printed in the window, so they do not get mixed with text coming in through the modem. In a CB simulator-type environment, this feature is invaluable.

*Sixth Sense 128* offers repeating keys, adjustable cursor, line wrap toggle, control character display toggle, and a built-in clock.

The program also has two built-in editors and includes search and bookmark features to make finding information easier. While the screen editor is more versatile, you are limited to editing one screen of data at a time. Since it's possible to switch between the editors at will, the one screen at a time limitation can be circumvented with a little effort. Information in the edit buffer can be saved to disk, in parts or as a whole. Editing space is limited by the amount of memory, as mentioned earlier.

### Documentation

The documentation could use an index. The appendices are marvelous and include a quick command lookup, sample macros, information on using RAM expansion modules, ASCII tables, and a cross-referenced command list that includes both direct and menu access. There's a tutorial at the beginning for those who want to get online quickly.

A direct command keys listing contained in the middle of the manual might have been more useful if placed on a separate card for easy access. However, at least it's there for reference if you need it.

#### Conclusion

In all honesty, if there's a feature of a great terminal package that isn't included in *Sixth Sense 128*, I couldn't name it. From sending special print codes to your printer to writing a transfer report on your screen after down- and uploads, this program seems to have it all. Though it's a bit more expensive than other terminal packages, as far as I can see *Sixth Sense 128* is worth the extra money.

Prism Software, 401 Lake Air Drive, Suite D, Waco, TX 76710 (phone: 817-751-0200). *—Cheryl Peterson*

## TAX MASTER

**Master Software**
**Commodore 64**
**Disk; $30**

While it may seem a little late in the year to be reviewing a tax package, I know I'm not the only one who is up until 3 a.m. on April 14 figuring out taxes. So for the rest of you stragglers, here's a last-minute look at an inexpensive yet operable tax program. (In case you think I'm kidding about waiting until the last minute, I didn't use this year's tax figures to test this package. I used my forms from last year, since I already knew what the totals would be.)

*Tax Master* is a BASIC program that is not copy protected. In fact, it's not even list protected. At one point, the documentation even tells you that if you use a printer that is device number 6, you have to list one line and change a value in it. To be able to list a commercially offered program these days is amazing. For those of you who are tempted to print it out, I'll warn you, it's a very long listing.

#### Forms Supported, Forms Missing

*Tax Master* will help you fill out many of the forms commonly used by most taxpayers. These include the 1040 with its accompanying Schedules A and B, Form 4562 (depreciation) which goes with Schedule C (income or loss from a business or profession), Schedules D (capital gains and losses), E (supplemental income—rents and royalties), and F (farm income). Two forms that are frequently required by those who fill out Schedule C are the Schedule W (two-earner deduction) and the Schedule SE (self-employment tax). These two forms are not included in the *Tax Master* system. The documentation does point out that if you have income from a business you will need to fill out a Schedule SE.

*Tax Master* also does not include the forms 1040A (short form) and the 1040 EZ (easy form). But then why would anyone need a computer program to fill out those two forms?

Speaking of filling out forms, *Tax Master* does not. You can print out the data for each form, but it is not formatted correctly to print on the IRS forms. You will have to manually fill them out.

#### Documentation

The small 14-page booklet is fairly comprehensive, despite its small size. The authors have managed to include

*Continued on page 106*

# TIPS AHOY!

## Compiled by Michael R. Davila

Contributors to *Tips Ahoy!* will be handsomely compensated immediately upon acceptance. Send your best programming or hardware hints to *Tips Ahoy!*, c/o Ion International Inc., 45 West 34th Street—Suite 407, New York, NY 10001. Include a stamped and self-addressed envelope if you want your submission returned.

### 64 BURST LOAD

If you own the Commodore 128 personal computer and the 1571 disk drive and find that it takes too long for a program to load from the 64 mode, use *64 Burst Load* for a nearly 200% increase in speed.

Many 128 owners, including myself, purchased the "quick" 1571 drive with their computer. Many of these same individuals were surprised (although not totally) to learn that, when the computer is in 64 mode, the quick drived is not much faster than the 1541. Consequently, I wrote *64 Burst Load* which will load the program from the 128 operating mode, switch to the 64 mode, and run the BASIC program for you.

When you've decided on a program to quick load, make a note of the name (for our example we'll use MENU). Next, load 64 BURST.BOOTER. List the program and change the variable F$ to MENU which is the name of the program we made a note of. Now, save the program with a meaningful name on the disk with MENU (I'll use MENU. BOOT). Then, load 64 BURST.CREATOR, insert the disk with MENU back into the drive, and run the program. This program creates an ML file on disk by the name of 64 BURST LOAD.ML. That's it! (Note: you can have more than one "boot" file on the same disk, but 64 BURST LOAD.ML is required only once.)

To see the speed increase, enter the following:

```
RUN"MENU.BOOT"
```

While the ML program is setting up your BASIC 2.0 program, the screen will remain undiscernible because the microprocessor will be running at 2.04 MHz (FAST mode).

—Shawn K. Smith
Bronx, NY

```
100 REM 64 BURST.CREATOR -SHAWN K. SMITH
110 BANK15:FORD=DEC("15B3")TODEC("1618")
120 READY$:POKED,DEC(Y$):T=T+PEEK(D)
125 NEXT:POKE243,9:IFT=14679THEN130
126 PRINT"?? DATA DOES NOT CHECK -";
127 PRINT"ERROR[3"!"]":END
130 INPUT"[DOWN][DOWN]PRESS RETURN TO SA
VE";Y$
140 BSAVE"64 BURST LOAD.ML",P5555TO P(D)
150 DATA A9,F7,8D,05,D5,A2,FF,78,9A,D8
160 DATA 8E,16,D0,20,A3,FD,20,50,FD,20
170 DATA 15,FD,20,5B,FF,58,20,53,E4,20
180 DATA BF,E3,A0,00,B9,E1,15,99,00,C0
190 DATA C8,D0,F7,4C,00,C0,A2,1C,84,FB
200 DATA 86,FC,84,FD,A2,08,86,FE,A2,84
210 DATA B1,FB,91,FD,C8,D0,F9,E6,FC,E6
220 DATA FE,CA,D0,F2,A9,19,A2,08,85,2D
230 DATA 86,2E,20,59,A6,20,33,A5,20,8E
240 DATA A6,A9,00,85,90,8D,30,D0,4C,AE
250 DATA A7,EA:PRINTDS$:END
```

### FILE SIZER

*File Sizer* offers a quick and convenient way of determining the number of bytes a file (PRG, USR, or SEQ) occupies, and every track and sector the file occupies. In determining the byte count, *File Sizer* does not rely on the block count of the file as displayed in the directory which can be altered to return a value from 0-65535. Although the program is written solely in BASIC, it is relatively quick because it does not read every single byte of the file to determine its size. I've used *File Sizer* with the 1541 and 1571 disk drives with total reliability.

—Shawn K. Smith
Bronx, NY

```
100 REM*PROGRAM-ID.          FILE SIZER.
110 REM*AUTHOR.              SHAWN K. SMITH
120 R$=CHR$(18):D$=CHR$(17):O$=CHR$(0)
130 INPUT "FILE NAME";N$:IFN$=""THENEND
140 OPEN1,8,15,"ID":OPEN8,8,8,+N$:GET#1,
E:IFETHEN240
150 PRINT#1,"M-R"CHR$(24)CHR$(00)CHR$(02
):GET#1,T$,S$:T=ASC(T$+O$):S=ASC(S$+O$)
160 PRINT"FIRST TRACK"T,"FIRST SECTOR";S
170 CLOSE8:OPEN8,8,8,"#0":CNT=0
180 PRINT#1,"U1:";8;0;T;S
190 PRINT#1,"M-R"CHR$(0)CHR$(3)CHR$(2)
200 GET#1,T$,S$:T=ASC(T$+O$):S=ASC(S$+O$
):REM NEXT TRK/SEC
210 IFTTHEN PRINT"NEXT TRACK ";T,"NEXT S
ECTOR ";S:CNT=CNT+1:GOTO180
220 BYT=CNT*254+S:IFCNTTHENBYT=BYT+252
230 PRINTD$R$"BYTES =";BYT
240 INPUT#1,E$,M$:PRINTD$R$E$M$
250 CLOSE8:CLOSE1:END
```

### C-64 CHAR

Have you ever wished there were a CHAR command on C-64? There is a way to simulate this by using a pair of unique POKEs. To set the vertical position use POKE214,(1-25). To set the horizontal position use POKE211,(1-40). To use these effectively, put a : PRINT : between them. For example:

```
10 POKE 214,13:PRINT:POKE 211,16
20 PRINT"HELLO, HOW ARE YOU"
```

—Paul Hicks
Fannin, GA

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Reader Service No. 193

## MACHINE LANGUAGE TO DISK

I have often desired to save a machine language program to disk without the complicated procedure of using a monitor or transfer program. My first program to do this was only 245 bytes long. I have now added a disk status check which brings the total just over one block.

This program will PEEK the locations and then print each byte from memory to disk as an ML program. The entry of the starting address will write the load address in high byte/low byte format to the disk so that the program may be loaded back to the same location with ,8,1 format.

It has many uses. I have been able to download a long ML routine which had been POKEd into memory and then substitute it for the data statements in a program. The BASIC program can then load the ML portion and SYS it. Load time can be greatly reduced with a split program of this type.

It may be used to download any part of the C-64 memory and save to disk. I have used it to download and check many sections of RAM and ROM including the Kernal and cassette buffer. With little modification, it can be used to print to the screen as token or CBM ASCII. Brevity makes it extremely useful and fast. You may find even more uses for it than I.

—Jim C. Sanders
Knoxville, TN

```
•10 OPEN15,8,15:INPUT"[CLEAR][DOWN][WHITE
]ENTER FILENAME";F$
•15 OPEN8,8,8,"0:"+F$+",P,W":GOSUB65
•20 INPUT"[DOWN]START ADDRESS :";S
•25 INPUT"[DOWN]ENDING ADDRESS:";E
•30 H=INT(S/256):L=S-(H*256)
•35 PRINT#8,CHR$(L);CHR$(H);
•40 FOR X=S TO E
•45 PRINT#8,CHR$(PEEK(X));
•50 NEXTX
•55 PRINT#8,CHR$(0);CHR$(0);CHR$(0)
•60 CLOSE8:CLOSE15:PRINT"[DOWN][RVSON]COM
PLETE !":END
•65 INPUT#15,EN,EM$,ET,ES
•70 IFEN<20THENRETURN
•75 PRINT:PRINTEN;EM$;ET;ES:CLOSE15:END
```

## MEMORY TRANSFER 128

Chris Jones' tip titled "Memory Transfer" in the February issue of *Ahoy!* is valid only for the Commodore 64. The same program can be used for the C-128 with one change. Substitute 4864 for 49152 in lines 10 and 40. The new program follows.

```
•10 I=4864:FORX=1024 TO 2023:U=PEEK(X):PO
KE I,U:I=I+1
•20 NEXT X
•30 PRINT CHR$(147):GETKEYA$
•40 I=4864:FORX=1024TO2023:U=PEEK(I):POKE
X,U:I=I+1
•50 NEXTX
```

This program now POKEs the current screen into RAM memory starting at 4864 for the C-128, clears the screen, and then recalls the saved screen.

Change line 40 by replacing FOR X=1024 TO 2023 TO FOR X=2023 TO 1024 STEP-1 to print the screen upside down.

—E. Stuart Johnson
Athens, AL

## DATASETTE $ DIRECTORY

With the price of the standard C-64 under $100 and datasettes under $20, it is possible for many new computerists to have a very reliable system to begin their computing adventures. The datasette is a dependable device, but unlike a disk, it is not possible to display a directory of what is on a cassette without playing the entire tape through. And if you are like me, you either never made, or have lost, the written record of what programs are on the cassette. After a few months you have a box full of tapes with no idea of what is on them.

*Datasette $ Directory*, when put on the beginning of a cassette, will emulate a disk directory listing for your tape. It will also help you form the correct habits for when you do buy a disk drive. First, type in the program and save it at the beginning of a new tape under the filename of "$". When you run the program the screen will prompt you for an S or a P. Press S and a sample directory will appear on the monitor or TV. You will see the title of the cassette, and, for each file on the tape, the counter position, name of file, and file type. Change the data in line 170 to the title you want for this cassette. Replace the data in lines 190-200 with the programs you put on the cassette. Save a little space after the directory program before saving your first program so you can save the directory program at the very beginning again after you make any additions. The data statements in lines 190-200 use the following format: counter position, file name, and file type.

When everything is complete, you can grab any tape you have "formatted," type LOAD"$", run the program after it is loaded, and a directory will appear. As a bonus, if you press P instead of S at the prompt, a label of the directory will be printed on your 1525-compatible printer. One final note: just like a disk, this program will only list the first 16 characters of a filename. This is merely to get you into the right habit for the day when you purchase a disk drive. A little work now will save you a lot of confusion later. (I know!!)

—James C. Hilty
Library, PA

```
•10 REM     DATASETTE $ DIRECTORY-JC HILTY
•20 PRINT"[CLEAR][4"[DOWN]"]PRESS P FOR P
RINTER OR S FOR SCREEN"
•30 GETK$:IFK$=""THEN30
•40 IFK$="S"THEN70
•50 IFK$="P"THEN110
•60 GOTO30
•70 PRINT"[CLEAR]CASSETTE DIRECTORY FOR:"
•80 READA$:B$=LEFT$(A$,16):PRINT"[RVSON]"
B$:PRINT
•90 READC$,A$,P$:IFC$="END"THENEND
•100 B$=LEFT$(A$,16):PRINTC$;"  ";B$;"  "
;P$:GOTO90
•110 OPEN2,4
```

```
120 PRINT#2,"CASSETTE DIRECTORY FOR":PRI
NT#2
130 READA$:B$=LEFT$(A$,16):PRINT#2,CHR$(
18);B$;CHR$(146):PRINT#2
140 READC$,A$,P$:IFC$="END"THENCLOSE2:EN
D
150 B$=LEFT$(A$,16):PRINT#2,C$;"  ";B$;"
 ";P$:GOTO140
160 REM    PLACE YOUR CASSETTE TITLE HER
E
170 DATA ARCADE GAMES
180 REM    PLACE YOUR COUNTER VALUES,PRO
GRAM NAMES,AND FILE TYPES HERE
190 DATA 020,MARTIAN MONSTERS,PRG,068,HI
DDEN CAVERN,PRG
200 DATA 148,SKULL CASTLE,PRG,175,MOUSE
IN THE HOUSE,PRG,202,MOUSEDATA,SEQ
210 REM    THIS MUST BE LAST DATA STATEM
ENT
220 DATA END,END,END
```

## CHANGING COLOR RAM

The Commodore 128 is full of surprises. You can do just about everything on it. Have you ever seen one of those games with letters that seem to fade in and then fade out? You can accomplish the same thing with my machine language program.

First, type in the data loader and save it. Be very careful when entering the data lines. These lines contain the actual machine language instructions that run the program. When in memory, type SYS 4864 ,, [color #]. The double comma is not an error in typing, but is a placeholder when the variable is passed through BASIC to the computer. In turn, the computer takes this number and stores it in the 1000 locations on the text screen, resulting in a color change. The change is extremely fast. The machine language program actually modifies itself so that the locations on the screen can be altered. The program reconfigures itself so it may be executed again. To achieve the fade in/out effect, try the small BASIC 7.0 program below. Be sure the machine language portion has been properly entered into memory through the data loader.

```
10 COLOR 0,1:COLOR4,1:GOSUB60
15 DO WHILE A$="":RESTORE50
20 FOR A=1TO6
25 FOR C=1TO40: NEXT
30 :READ B:SYS 4864 ,,B
35 NEXT : GET A$
40 LOOP : SCNCLR :END
45 :
50 DATA 11,12,15,1,15,12
55 :
60 GRAPHIC 0,1 :REM CLEAR SCREEN AND PRI
NT MESSAGE
65 CHAR 1,10,3,"THIS PROGRAM USES"
70 CHAR 1,10,4,"A SMALL ML PRG"
75 CHAR 1,10,5,"TO CHANGE THE"
80 CHAR 1,10,6,"COLOR OF THE"
85 CHAR 1,10,7,"CHARACTERS."
```

After the program has begun its execution, press a key to terminate it. If the produced effect is not to your liking, you should change the length of the delay loop in line 24.

Other applications for this sort of routine may be when you have an arcade game, or some other program where you are prompting the user to press a key after he or she has finished reading the text. During the keyscan phase, you should check whether or not a key has been pressed. If not, you should change the colors of the characters on the screen. This can be done by selecting a random variable and placing it in the SYS statement.

You could also achieve a glowing effect with the following routine:

```
DO:SYS 4864 ,, INT(RND(0)*17):LOOP
```

In order to break the loop, press either RUN STOP or RUN STOP and RESTORE.

—Robert J. Tiess
Middletown, NY

```
10 FOR D=0TO27
15 :READ A$ : V=DEC(A$)
20 :POKE (4864+D),V
25 NEXT
30 :
35 DATA 8A,8D,00,D8
40 DATA EE,02,13
```

```
•45 DATA AD,02,13
•50 DATA D0,F4,EE,03,13
•55 DATA AD,03,13
•60 DATA C9,DC,D0,EA
•65 DATA A9,D8,8D,03,13
•70 DATA 60,EA
•75 :
```

**NO RETURN**

Ever wish you could exit a subroutine without having to RETURN from the GOSUB? Sometimes it's more convenient if the program can forget about RETURNing and just keep going. Unfortunately, this can cause problems. Whenever a GOSUB takes place, the RETURN address is placed on what is called the "stack." If your program skips too many RETURNs, the stack overflows and an error results. But there is a way around the problem.

*No RETURN* lets you exit subroutines whenever you want, with no ill effects. No matter how often you dodge RETURNs, the computer keeps chugging away. Just add *No RETURN* to your own programs. Whenever you want a program to ignore a RETURN, have it SYS679 for the C-64 or SYS4864 for the C-128. *No RETURN* pulls the RETURN address off the stack, so your program continues merrily on its way.

To demonstrate, run *No RETURN* to POKE the data into memory. Then run this little two-line program:

```
10 GOSUB20
20 A=A+1:PRINTA:SYS679:GOTO10
```



Of course you'd want line 20 to SYS4864 if using a Commodore 128. If this program were running without the SYS to *No RETURN*, an error would be certain to occur in very short order. But because of the fact that *No RETURN* keeps pulling the RETURN address from the stack, the program will run continuously.

Both versions of *No RETURN* can be relocated by changing J in line 10. —Buck Childress
Salem, OR

**C-64 VERSION**

```
•1 REM *** C-64 VERSION ***
•2 FORJ=679TO679+22:READA:POKEJ,A:NEXTJ:E
ND
•3 DATA104,104,169,255,133,74,32,138,163,
154,201,141
•4 DATA240,3,76,224,168,104,104,104,104,1
04,96
```

**C-128 VERSION**

```
•1 REM *** C-128 VERSION ***
•2 FORJ=4864TO4864+23:READA:POKEJ,A:NEXTJ
:END
•3 DATA104,104,104,104,169,141,32,170,79,
240,5,162
•4 DATA12,76,60,77,32,80,80,160,5,76,89,8
0
```

**DISK JACKET**

Are you short a disk jacket? If you have a printer, scissor, and some glue or tape, you can easily create your own jacket with the program below. This program prints an outline for the jacket and all you do is cut, fold, and glue and flaps together. If you don't have a printer and still want to use this program, find someone that does have a printer and print a copy but don't cut it. Keep this as your master copy. Next, copy this sheet as many times as you need jackets with a duplicating machine. Then use the same instructions as above and make yourself some jackets. Also try different color paper for your printer. It helps make your disks easier to find.

—Myong Paek
Portland, OR

```
•1 REM ** DISK JACKET PRINTER **
•2 PRINT"SET PRINTER AND PAGES RETURN"
•3 GETA$:IFA$<>CHR$(13)THEN3
•4 OPEN4,4:FORE=1TO5:PRINT#4:NEXT
•5 X$="-":FORE=1TO73:L$=L$+X$:NEXT:PRINT#
4,L$
•6 FORE=1TO55:B$=B$+" ":M$=M$+X$:NEXT:S$=
"![7" "]!"
•7 FORE=1TO22:PRINT#4,S$;B$;S$:NEXT:S$="[
8" "]!"
•8 PRINT#4,L$
•9 FORE=1TO27:PRINT#4,S$;B$;"!":NEXT
•10 PRINT#4,"[9" "]";M$:PRINT#4:CLOSE4
```

# COMMODARES
## PROGRAMMING CHALLENGES
### By Dale Rupert

Each month, we'll present several challenges designed to stimulate your synapses and toggle the bits in your cerebral random access memory. We invite you to send your solutions to:

*Commodares*, c/o *Ahoy!*
P.O. Box 723
Bethel, CT 06801

We will print and discuss the cleverest, simplest, shortest, most interesting and/or most unusual solutions. Be sure to identify the *name* and *number* of the problems you are solving. Also show sample runs if possible. Be sure to tell what makes your solutions unique or interesting, if they are.

Programs on diskette (1541 format only) are welcome, but they must be accompanied by listings. You must enclose a stamped, self-addressed envelope if you want any of your materials returned. Solutions received by the middle of the month shown on the magazine cover are most likely to be discussed, but you may send solutions and comments any time. Your original programming problems, suggestions, and ideas are equally welcome. The best ones will become *Commodares*!

#### PROBLEM #41-1: REAL THING

This problem was submitted by J.H. Smalley (Boulder, CO). The largest floating point number in the Commodore computers according to the reference manual is (2 ↑ 127 − 1) or roughly 1.70141183E+38. Write a short program to display the *exact* value of 2 ↑ 127 − 1.

#### PROBLEM #41-2: NEW NAME

Try this one from Lon Olson (Mesa, AZ). Have the computer generate all possible 5-letter names for your new company according to the following rules:

1) The first letter is the initial of your first name.
2) The fifth letter is the initial of your last name.
3) Of the middle three letters, at least one is a vowel (a, e, i, o, or u).
4) All five letters must be different (except the first and fifth may be the same).

Your program should print out all valid possibilities. Mention any significant names you come up with. If my name were Dale Smith, I could call my business DARES Incorporated.

#### PROBLEM #41-3: WORD SLIDER

Here is a good string animation challenge from Scott McClare (Espanola, ONT). Display two words on the screen. One word is against the left edge of the screen and the other word is against the right edge, both on the same line. Now move the words towards each other and have them pass through one another until their positions on the line have been exchanged. The word initially on the right has priority and its letters are visible when the two words overlap.

For example, CAT and DOG look like this:

```
CAT   DOG
 CATDOG
  CDOG
  DOGT
 DOGCAT
DOG   CAT
```

All action takes place on a single screen line, not several lines as shown in this example.

#### PROBLEM #41-4: SMITH NUMBERS

Give the ROM math routines a good workout with this one suggested by Sol Katz (Lakewood, CO). A Smith number is an integer with the sum of its digits equal to the sum of the digits of its prime factors. For example, 4,937,775 is a Smith number. It can be written in terms of its prime number factors as (3*5*5*65837), and amazingly enough the sum of the digits in those numbers (42) equals the sum of the digits in the original number. Write a program to find and print Smith numbers. Who is Smith? No telling, but his telephone number is 493-7775. (Who says mathematics is always serious?)

This month we will see some of the best and most interesting solutions to the *Commodares* in the January 1987 issue of *Ahoy! Problem #37-1: Magic Square* submitted by Karen Middaugh (San Diego, CA) was solved in a variety of ways. The problem was to let the computer

fill in the blanks of this matrix to create a magic square:

```
20  --  --
--  25  --
--  --  30
```

The numbers 5, 10, 15, 35, 40, and 45 were to be placed so that the sum of each row, each column, and both diagonals is 75.

Thomson Fung (San Diego, CA) used some algebra to set up his program. In this arrangement:

```
20  X   Z
--  25  Y
--  --  30
```

the following algebraic expression must be true since the sums of the rows and columns are equal: 20 + X + Z = 30 + Y + Z. Lines 20 through 35 in his program below determine values of X and Y to satisfy the expression 20 + X = 30 + Y which comes from the expression above.

```
1 REM ====================================
2 REM     COMMODARES PROBLEM #37-1 :
3 REM     MAGIC SQUARE
4 REM     SOLUTION BY
5 REM     THOMSON FUNG
6 REM ====================================
10 DIM M(3,3) : M(1,1)=20
15 M(2,2)=25 : M(3,3)=30
20 FOR X=5 TO 15 STEP 5
25 FOR Y=5 TO 45 STEP 5
30 IF X+20=Y+30 THEN M(1,2)=X : M(2,3)=Y
 : GOTO 40
35 NEXT : NEXT
40 REM - FILL IN BLANKS -
45 M(1,3)=75-20-M(1,2)
50 M(3,1)=75-25-M(1,3)
55 M(3,2)=75-30-M(3,1)
60 M(2,1)=75-20-M(3,1)
65 PRINT : PRINT" MAGIC SQUARE:"
70 FOR I=1 TO 3
75 FOR J=1 TO 3
80 PRINT M(I,J); : NEXT
85 PRINT : NEXT
```

Once X and Y are known, the other values are calculated in lines 45 through 60. The square is printed in lines 65 through 85. This program gives one of the two possible solutions to the problem. The other solution is a reflection across the diagonal (the transpose) of the square. Swap the first row and first column, second row and second column, third row with third column.

Another breed of solution performs permutations of the numbers until a combination is found which fits. The following program from Terrence Stender (Kalamazoo, MI) does just that.

```
1 REM ====================================
2 REM     COMMODARES PROBLEM #37-1 :
3 REM     MAGIC SQUARE
4 REM     SOLUTION BY
5 REM     TERRENCE STENDER
6 REM ====================================
10 D=7:K(0)=3:K(8)=5:T=56:B=1:FORK=0TO10
 :B(K)=B:C(K)=2047-B:B=B+B:T(K)=10:NEXT
20 K(D)=-1:IF D=4 THEN K(D)=4 : D=3 : GO
TO 20
30 K(D)=K(D)+1:K=K(D):IF D=4 THEN K(D)=4
 : D=5 : GOTO 30
40 IF K>8 THEN T=T AND C(T(D)) : T(D)=10
 : D=D+1 : GOTO 30
50 IF T AND B(K) THEN 30
60 T=T AND C(T(D)) : T=T OR B(K) : T(D)=
K : D=D-1 : IF D>0 THEN 20
70 D=1:IF K(0)+K(1)+K(2)<>12 OR K(3)+K(4
)+K(5)<>12 OR K(6)+K(7)+K(8)<>12 THEN 30
80 IF K(6)+K(7)+K(8)<>12 OR K(0)+K(3)+K(
6)<>12 OR K(1)+K(4)+K(7)<>12 THEN 30
90 IF K(2)+K(4)+K(6)<>12 THEN 30
100 FOR I=0 TO 2 : FOR J=0 TO 2 : PRINT
(K(I*3+J)+1)*5;:NEXT J:PRINT:NEXT I
```

Terrence's program solves for a magic square using digits 0 through 8 with sums to 12. It then adds one and multiplies each digit by 5 to get the desired digits 5 through 45. Lines 20-60 generate the permutation of the digits. Lines 70-90 check for a valid magic square. Line 100 does the conversion and printing.

Terrence uses bit manipulation in the variable T to determine if a number is free or used within the current permutation. Bits 0-8 in the binary representation of T correspond to numbers 0-8. The counters K(0) through K(8) keep track of the current arrangement. K(0), K(4), and K(8) are reserved for 3, 4, and 5 (the diagonal given in the problem). T=56 in line 10 reserves 3, 4, and 5 since 56=(2 ↑ 3 OR 2 ↑ 4 OR 2 ↑ 5).

Jim Speers (Niles, MI) sent the following general magic square generator.

```
1 REM ====================================
2 REM     COMMODARES PROBLEM #37-1 :
3 REM     MAGIC SQUARE
4 REM     SOLUTION BY
5 REM     JIM SPEERS              (C-128)
6 REM ====================================
10 INPUT"LENGTH OF SIDE (ODD-3 TO 9)";NS
:IF NS/2=INT(NS/2) OR NS<3 THEN 10
20 DIM M(NS,NS),N(NS*NS):INPUT"STARTING
NUMBER";S:INPUT"[DOWN]INTERVAL";D
30 N(1)=S:FOR I=2 TO NS*NS:N(I)=N(I-1)+D
:NEXT
40 DEF FNA(X)=X-NS*(X<1)+NS*(X>NS):K=K+1
:X=INT(NS/2)+1:Y=NS
50 IF M(X,Y)<>0 THEN X=FNA(X-1):Y=FNA(Y-
2):GOTO 50
```

```
•60 M(X,Y)=N(K):X=FNA(X+1):Y=FNA(Y+1):K=K
 +1:IF K=NS*NS+1 THEN 80
•70 GOTO 50
•80 FOR I=1 TO NS:FOR J=1 TO NS:PRINT USI
 NG"[4"#"]";M(J,I);:NEXTJ:PRINT:NEXTI
•90 FOR I=1 TO NS:TL=TL+M(I,I):NEXTI:PRIN
 T"[DOWN]ROW/COLUMN/DIAGONAL TOTAL=";TL
```

Jim's program produces any odd-order square (three-by-three or larger) with any starting value and any increment between digits. On a 40-column screen, a nine-by-nine square is the largest that is nicely displayed. With an 80-column screen, this program handles a 17-by-17 magic square. Use a wide-carriage printer and do better than that. C-64 users must replace the PRINT USING statement in line 80 with PRINT. PRINT USING provides a handy way of formatting the output so that all numbers are printed using four spaces ("####") on the screen.

Jim gives this formula for the row or column total T:

```
T=S*(B+(S^2-1)*I/2)
```

where S=length of side; B=beginning number; I=increment. For the original three-by-three square, S=3, B=5, and I=5 giving the total T=75.

I tried to convince everyone that *Problem #37-2: Outcast Order* submitted by Thomson Fung (San Diego, CA) was a tough one. Apparently that only encouraged our readers. There were dozens of solutions, with some readers sending two or three different ones. I still feel that it is quite a significant challenge.

This problem was a simulation of the game Musical Chairs (thanks to Joe Wright of Louisville, KY for the analogy). With N people arranged in a circle, start at number one and remove each Mth person. As a person is removed, the circle is closed. Counting from 1 to M begins with the next person remaining. The program displays the order in which the people are removed (outcast) from the circle. When N=4 and M=3, the people are outcast in the order 3,2,4,1.

To determine which solutions to use in this column, I look for programs which are 1) short, 2) accompanied by clear, concise descriptions of how the program works, or 3) both. Since I can't possibly type and run every program, I depend upon your clear explanation of your work. A disk with your program saves me the time of entering the program, but your description of the listing or your approach to the problem usually determines whether I even run your program.

It is not a difficult matter to spot the essence of conciseness in this solution submitted by David Hoffner (Brooklyn, NY).

```
•1 REM ==================================
•2 REM    COMMODARES PROBLEM #37-2 :
•3 REM    OUTCAST ORDER
•4 REM    SOLUTION BY
•5 REM    DAVID HOFFNER
•6 REM ==================================
•10 INPUT"PEOPLE";N:INPUT"OUTCAST #";M:DI
 M A(N)
•20 Y=Y+1+N*(Y=N):ON A(Y) GOTO 20:X=X+1:I
 F X=M THEN PRINT Y:A(Y)=1:X=0
•30 GOTO 20
```

This program is proof that the problem is tough, since David generally condenses his solutions down to two lines, maximum. Here he needed three lines, and even then the program never ends. David mentioned that he would have to lengthen the program to make it end.

Notice how the second statement in line 20 steps through the array without an IF/THEN statement. If A(Y) is zero, the ON A(Y) statement "falls through" to the X=X+1 statement. If A(Y) is 1, meaning that person is outcast, the ON statement branches back to the start of line 20. (Don't forget to press the RUN STOP key when the program is done.)

Most other solutions used a similar approach of "marking" an element in an array when it is cast out, and stepping through the array until the proper numbers of unmarked elements have been counted. The process of stepping through the elements is known as modular arithmetic. Some solutions created the MOD function which is not available in Commodore BASIC to perform this task. Look at this solution from Keith Kushner (Brooklyn, NY):

```
•1 REM ==================================
•2 REM    COMMODARES PROBLEM #37-2 :
•3 REM    OUTCAST ORDER
•4 REM    SOLUTION BY
•5 REM    KEITH KUSHNER
•6 REM ==================================
•10 INPUT"N,M";N,M:DIM AA(N):FOR T=1 TO N
 : AA(T)=T : NEXT T
•20 FOR U=NTO1STEP-1:P=INT(((P+M)/U-INT((
 P+M)/U))*U+.5):P=P-U*(P=0):PRINT AA(P)
•30 FOR V=P TO U-1:AA(V)=AA(V+1):NEXT V:P
 =P-1 : NEXT U
```

The second statement in line 20 performs the modular operation P=(P + M) MOD U. This gives the whole number remainder when the quantity (P + M) is divided by U. The array AA( ) initially holds N elements. When the Pth person is cast out, the array is closed up by means of the V FOR/NEXT loop in line 30. The first U elements of AA( ) are the identities of the people still remaining in the circle.

The most elegant and interesting solution to this problem was sent by Mike Strawn (Warren, MI). It uses a linked-list data structure.

```
•1 REM ==================================
•2 REM    COMMODARES PROBLEM #37-2 :
•3 REM    OUTCAST ORDER
```

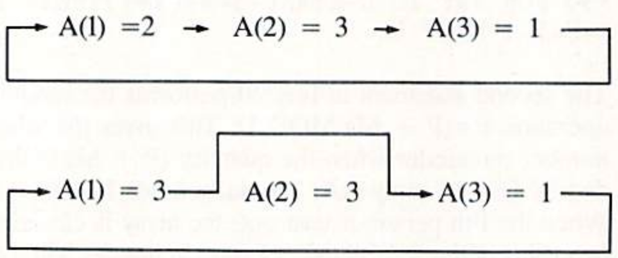
```
•4 REM     SOLUTION BY
•5 REM     MIKE STRAWN
•6 REM ====================================
•10 INPUT"N,M";N,M :DIM A(N) :FOR I=0 TO
 N-1: A(I)=I+1 : NEXT : A(N)=1
•20 FOR I=1 TO M: PP=P: P=A(P): NEXT: PRI
 NT P;: A(PP)=A(P): IF P<>PP THEN 20
```

This deceptively simple program quickly and easily solves the problem. The linked-list data structure requires some explanation. The array in the linked-list is used differently from the arrays in the previous programs. Here the index (the 2 in A(2) for example) represents the person. The value of the array element (the value of A(2) ) represents the next person in the circle. Initially the value of A(2) is three since person number three is next to person number two.

Two variables keep track of the selected person (P) and the previous person (PP) in the circle. The FOR/NEXT loop in line 20 steps through M people. At each step, the previous person pointer is updated (PP=P), and the pointer to the next person is stored in P (P=A(P) ). Once M people have been counted, P then indicates the number of the person who will be cast out. So far, so good.

The beauty of the linked-list is the simple way in which a person can be removed from the chain. The statement A(PP)=A(P) takes care of it! This statement eliminates the Pth person from the list. How? By changing the variable pointing to the outcast person (A(PP) ) so that it now points to the person after the outcast one (A(P) ). Remember that A(P) points to the person next to the Pth person.

For example, assume A(1)=2, A(2)=3, A(3)=1. If the second person is to be ousted, P has a value of 2 and PP has a value of 1. The statement A(PP)=A(P) assigns the value 3 to A(1). Consequently A(1) points to person number 3 instead of pointing to number 2. Person number 2 has now been removed from the list. This figure should clarify the process.




Thanks to Mike Strawn for the program and an explanation of linked-lists. By the way, the program ends when P equals PP, implying that the last element in the array is pointing to itself.

For *Problem #37-3: Power Product* submitted by Oren Dalton (El Paso, TX), there were three categories of readers' responses: 1) those that found and stated the correct answer (2592), 2) those that concluded there is no correct answer, and 3) those that sent a program listing but didn't mention whether the program arrives at an answer or not. Needless to say, I didn't consider those of the third category.

The problem was to find digits A, B, C, and D, if any, for which the four-digit number ABCD equals the expression (A ↑ B)*(C ↑ D) where " ↑ " means exponentiation. A straightforward, correct solution is shown below from J. Alan Kehr (St. Paul, MN).

```
•1 REM ====================================
•2 REM     COMMODARES PROBLEM #37-3 :
•3 REM     POWER PRODUCT
•4 REM     SOLUTION BY
•5 REM     J. ALAN KEHR
•6 REM ====================================
•10 E=1000 : F=100 : G=10
•20 FOR A=0TO9 : FOR B=0TO9 : FOR C=0TO9:
  FOR D=0TO9
•30 H=E*A+F*B+G*C+D
•40 I=INT(A[UPARROW]B*C[UPARROW]D)
•50 IF H=I THEN PRINT I
•60 NEXT : NEXT : NEXT : NEXT
```

Alan's solution steps through all values for each of the four digits. The four-digit number ABCD is stored in H. The right side of the expression is stored in I. Finally the values of H and I are compared. If they agree, a solution has been found.

The key to the success of Alan's program is his use of the INT function in line 40. Exponentiation is slow and it often produces inexact results. Consequently it is best avoided. If it is unavoidable as it is here, the next best thing is to correct for its shortcomings.

For example, 9 ↑ 4 gives 6561.00001 instead of 6561. The INT function truncates the extraneous portion and gives the right answer. To be on the safe side, it is better to add some small decimal to the number before applying the INT function. INT(A ↑ B + .01) is a good way to find the correct result. That works even if the exponentiation gives a result just less than the exact value. (Let P=19 ↑ 6. Compare P, INT(P), and INT(P+.01) for example.)

Now for ways to speed up this fifteen-minute plus program (eight minutes on the C-128 in FAST mode). Necah Buyukdura (Ankara, Turkey) used the fact that the solutions must be between 1037 and 9490, since 1 ↑ 0 * 3 ↑ 6 gives only a three digit result and 9 ↑ 4 * 9 ↑ 1 gives five digits.

Perry Pessia (El Segundo, CA) used a nice, fast method of keeping track of the four digit number ABCD. Rather than combine the four digits numerically as in the previous program or with strings as in many other solutions, Perry simply used a separate variable H which is incremented each time through the loop. Change line 30 of the program above to H=H+1. In line 10 set H to 999 initially. Also change the starting value of the A loop to 1 in line 20. One addition in line 30 is certainly faster than the original three multiplications and three additions,

giving just under 7 minutes on the C-128.

A huge time savings is realized in this program by Scott Duncan (Superior, NE).

```
•1 REM ==================================
•2 REM    COMMODARES PROBLEM #37-3 :
•3 REM    POWER PRODUCT
•4 REM    SOLUTION BY
•5 REM    SCOTT DUNCAN
•6 REM ==================================
•9 T0=TI
•10 DIM P(99):FOR X=10 TO 90 STEP10:P(X)=
 1:A=INT(X/10)
•20 FOR Y=1 TO 9:P(X+Y)=P(X+(Y-1))*A:NEXT
 :NEXT
•30 FOR L=1 TO 99:IF P(L)>9999 GOTO 100
•40 FOR M=0 TO L
•50 Q=P(L)*P(M) : IF Q>9999 GOTO 100
•60 J=L*100+M : K=M*100+L
•70 IF Q=J THEN A=L:C=M:GOSUB 120
•80 IF Q=K THEN A=M:C=L:GOSUB 120
•90 NEXT M
•100 NEXT L
•110 PRINT "TOTAL " T : PRINT (TI-T0)/60
 "SECONDS": END
•120 A$=STR$(A+1000) : C$=STR$(C+1000) :
 T=T+1
•130 PRINT Q"= "MID$(A$,4,1) "[UPARROW]"
 MID$(A$,5)" * "MID$(C$,4,1)"[UPARROW]"MI
 D$(C$,5):RETURN
```

Scott's program spends some initial time calculating and storing X ↑ Y for all single-digit values of X and Y (using multiplication for speed and accuracy). These values are stored in the array P(99) so that X ↑ Y = P(X*10 + Y). For example, P(25) = 2 ↑ 5 = 32. In the main loops of the program, accessing an array element is *much* faster than exponentiation. The result: under 45 seconds on the C-128. Good work, Scott!

The final challenge was *Problem #37-4: Phrase Reverser* by Leo Brenneman (Erie, PA). The one-liner in line 10 from Paul Parker (Villa Rica, GA) nicely solves the novice problem which was to reverse the entire phrase. Paul's expert-class solution is in lines 110 through 150. It reverses the phrase on a word-by-word basis.

```
•1 REM ==================================
•2 REM    COMMODARES PROBLEM #37-4 :
•3 REM    PHRASE REVERSER
•4 REM    SOLUTION BY
•5 REM    PAUL PARKER
•6 REM ==================================
•9 REM --- NOVICE SOLUTION ---
•10 INPUT"PHRASE";S$:FORA=LEN(S$)TO1STEP-
 1:R$=R$+MID$(S$,A,1):NEXT:PRINTR$
•20 PRINT"TYPE - RUN 110 - FOR EXPERT SOL
 UTION" : STOP
•100 REM --- EXPERT SOLUTION ---
•110 INPUT"WORD(S) TO REVERSE";S$
•120 FORA=1TOLEN(S$):R$=MID$(S$,A,1):IFR$
 =" "THEN 140
•130 SR$=SR$+R$ : NEXT A
•140 FOR B=LEN(SR$)TO1STEP-1:PRINTMID$(SR
 $,B,1);:NEXT:PRINT" ";:SR$=""
•150 IF A>LEN(S$) THEN END
•160 NEXT
```

Type RUN 110 to see the expert solution. Jim Speers (Niles, MI) suggested using the famous Napoleonic palindrome "ABLE WAS I ERE I SAW ELBA" in both programs. This will look as though the order of the words is being changed in one case, and as though nothing happened in the other.

Rather than step through the string a letter at a time, Wallace Leeker (Lemay, MO) used the INSTR function on the C-128 to locate the spaces between the words in this solution to the expert problem.

```
•1 REM ==================================
•2 REM    COMMODARES PROBLEM #37-4 :
•3 REM    PHRASE REVERSER
•4 REM    SOLUTION BY
•5 REM    WALLACE LEEKER
•6 REM ==================================
•10 INPUT"PHRASE";S$:S$=S$+" ":L=LEN(S$)
•20 B=X+1:X=INSTR(S$," ",B)
•30 FORA=X-1TOBSTEP-1:PRINTMID$(S$,A,1);
•40 NEXTA:IFX<LTHENPRINT" ";:GOTO20
```

The expression X=INSTR(S$," ",B) gives X a value corresponding to the first occurrence of a space within S$ starting from position B. The loop at line 30 is executed for each space character in the phrase.

There were multitudes of other first-rate programs. This is a list of readers with solutions not already mentioned. Keep those problems and answers coming. □

Jim Albro (Tampa, FL)
Larry Anderson (Chugiak, AK)
Sean Bates (North Stonington, CT)
Gary Bond (Topeka, KS)
Mark Breault (Brandon, MAN)
David Brouse (Harrisburg, PA)
Carlton Burton (Easton, TX)
Sean-Marc Castruita
Carlos Centeno (Lares, PR)
Doug Chapman (Belleville, KS)
Steve Christensen (Lake City, MI)
Chris Colbe (Norwood, PA)
Dale Conrad (Bridgewater, NS)
Ralph D'Andrea (Toronto, ONT)
Curt Donofrio (Shelton, CT)
Mark Dulski (Neenah, WI)
S. Edwards (Daytona Beach, FL)
S. Edwardson (La Tuque, QUE)
Bret Ekstrand (Signal Hill, CA)
F. John Enos (Westoh, CT)
Kevin Eshback (Sanatoga, PA)
Harold Garter (Phoenix, AZ)
S. Gustafson (New Albany, IN)
J.V. Henry (North Fork, CA)
Ellis Hormats (Maitland, FL)
Dale Kendall (New Castle, NH)
Claude Landusky (Waianae, HI)
G. Majewski (Chicago, IL)
Scott McClare (Espanola, ONT)
Jeff McCreary (Prince Fred., MD)
Karen Middaugh (San Diego, CA)
Mike Murphy (Norwood, PA)
R. Needham (Croton-on-Hudson, NY)
Lon Olson (Mesa, AZ)
H. Osajima (Des Plaines, IL)
Norman Richards (Angleton, TX)
Rick Schwamle (Overland, MO)
Bill Shipley (Emington, IL)
Clyde Shonk (Chandler, AZ)
J.H. Smalley (Boulder, CO)
Bob Snader (Baltimore, MD)
Paul Sobolik (Pittsburgh, PA)
Jerry Torres (Daggett, CA)
John Van Marter (Arlington, TX)
William Watson (Pevely, MO)
Ron Weiner (Levittown, PA)
N. Whitaker (Jeffersonville, KY)
Joseph Wright (Louisville, KY)
Don Wynkoop (Tucson, AZ)

# PROGRAM LISTINGS

**Attention new *Ahoy!* readers! You must read the following information very carefully prior to typing in programs listed in *Ahoy!* Certain Commodore characters, commands, and strings of characters and commands will appear in a special format. Follow the instructions and listings guide on this page.**

On the following pages you'll find several programs that you can enter on your Commodore computer. But before doing so, read this entire page carefully.

To insure clear reproductions, *Ahoy!'s* program listings are generated on a daisy wheel printer, incapable of printing the commands and graphic characters used in Commodore programs. These are therefore represented by various codes enclosed in brackets [ ]. For example: the SHIFT CLR/HOME command is represented onscreen by a heart. The code we use in our listings is [CLEAR]. The chart below lists all such codes which you'll encounter in our listings, except for one other special case.

The other special case is the COMMODORE and SHIFT characters. On the front of most keys are two symbols. The symbol on the left is obtained by pressing that key while holding down the COMMODORE key; the symbol on the right, by pressing that key while holding down the SHIFT key. COMMODORE and SHIFT characters are represented in our listings by a lower-case "s" or "c" followed by the symbol of the key you must hit. COMMODORE J, for example, is represented by [c J], and SHIFT J by [s J].

Additionally, any character that occurs more than two times in a row will be displayed by a coded listing. For example, [3 "[LEFT]"] would be 3 CuRSoR left commands in a row, [5 "[s EP]"] would be 5 SHIFTed English Pounds, and so on. Multiple blank spaces will be noted in similar fashion: e.g., 22 spaces as [22 " "].

Sometimes you'll find a program line that's too long for the computer to accept (C-64 lines are a maximum of 80 characters, or 2 screen lines long; C-128 lines, a maximum of 160 characters, 2 or 4 screen lines in 40 or 80 columns respectively). To enter these lines, refer to the *BASIC Command Abbreviations Appendix* in your User Manual.

On the next page you'll find our *Bug Repellent* programs for the C-128 and C-64. The version for your machine will help you proofread programs after typing them. (Please note: the *Bug Repellent* line codes that follow each program line, in the whited-out area, should *not* be typed in. See instructions preceding each program.)

On the second page following you will find *Flankspeed*, our ML entry program, and instructions on its use.

**Call *Ahoy!* at 212-239-6089 with any problems (if busy or no answer after three rings, call 212-239-0855).**

| WHEN YOU SEE | IT MEANS | YOU TYPE | YOU WILL SEE |
|---|---|---|---|
| [CLEAR] | Screen Clear | SHIFT CLR/HOME | |
| [HOME] | Home | CLR/HOME | |
| [UP] | Cursor Up | SHIFT ↑ CRSR ↓ | |
| [DOWN] | Cursor Down | ↑ CRSR ↓ | |
| [LEFT] | Cursor Left | SHIFT ← CRSR → | |
| [RIGHT] | Cursor Right | ← CRSR → | |
| [SS] | Shifted Space | SHIFT Space | |
| [INSERT] | Insert | SHIFT INST/DEL | |
| [DEL] | Delete | INST/DEL | |
| [RVSON] | Reverse On | CNTRL 9 | |
| [RVSOFF] | Reverse Off | CNTRL 0 | |
| [UPARROW] | Up Arrow | ↑ | ↑ |
| [BACKARROW] | Back Arrow | ← | ← |
| [PI] | PI | π | π |
| [EP] | English Pound | £ | £ |

| WHEN YOU SEE | IT MEANS | YOU TYPE | YOU WILL SEE |
|---|---|---|---|
| [BLACK] | Black | CNTRL 1 | |
| [WHITE] | White | CNTRL 2 | |
| [RED] | Red | CNTRL 3 | |
| [CYAN] | Cyan | CNTRL 4 | |
| [PURPLE] | Purple | CNTRL 5 | |
| [GREEN] | Green | CNTRL 6 | |
| [BLUE] | Blue | CNTRL 7 | |
| [YELLOW] | Yellow | CNTRL 8 | |
| [F1] | Function 1 | F1 | |
| [F2] | Function 2 | SHIFT F1 | |
| [F3] | Function 3 | F3 | |
| [F4] | Function 4 | SHIFT F3 | |
| [F5] | Function 5 | F5 | |
| [F6] | Function 6 | SHIFT F5 | |
| [F7] | Function 7 | F7 | |
| [F8] | Function 8 | SHIFT F7 | |

# BUG REPELLENT FOR THE 64 & 128 By BUCK CHILDRESS

Please note: the *Bug Repellent* programs listed here are for *Ahoy!* programs published from the May 1987 issue onward! For older programs, use the older version.

Type in, save, and run *Bug Repellent*. You'll be asked if you want automatic saves to take place. If so, you're prompted for the device, DISK (D) or TAPE (T). You then pick a starting file number, 0 through 99. Next, you enter a name, up to 14 characters long. At this point, *Bug Repellent* verifies your entries and gives you a chance to change them if you want. If no changes are needed, *Bug Repellent* activates itself. (Pressing RETURN without answering the prompts defaults to disk drive and begins your files with "00BACKUP".)

As you enter program lines and press RETURN, a *Bug Repellent* code appears at the top of your screen. If it doesn't match the code in the program listing, an error exists. Correct the line and the codes will match.

If used, automatic saves take place every 15 minutes. When the RETURN key is pressed on a program line, the screen changes color to let you know that a save will begin in about three seconds. You may cancel the save by pressing the RUN STOP key. The file number increments after each save. It resets to 00 if 99 is surpassed. After saving, or cancelling, the screen returns to its original color and the timer resets for 15 minutes.

When you've finished using *Bug Repellent*, deactivate it by typing SYS 49152 [RETURN] for the Commodore 64 or SYS 4864 [RETURN] for the Commodore 128.

## C-64 BUG REPELLENT

```
·10 PRINTCHR$(147)"LOADING AND CHECKING THE DATA[3"."]":J
=49152
·20 FORB=0TO11:READA:IFA<0ORA>255THEN40
·30 POKEJ+B,A:X=X+A:NEXTB:READA:IFA=XTHEN50
·40 PRINT:PRINT"ERROR IN DATA LINE:"PEEK(64)*256+PEEK(63)
:END
·50 X=0:J=J+12:IFJ<49456THEN20
·60 POKE198,0:POKE49456,0:A$="Y":B$=A$:C$="D":D$="DISK":D
=8:PRINTCHR$(147)
·70 INPUT"DO YOU WANT AUTOMATIC SAVES (Y/N)";A$:PRINT:IFA
$="Y"THEN90
·80 PRINT"NO AUTOMATIC SAVES[3"."]":GOTO150
·90 POKE49456,1:INPUT"DISK OR TAPE (D/T)";C$:IFC$<>"D"THE
ND=1:D$="TAPE"
·100 POKE49457,D:D$=D$+" DRIVE":PRINT:INPUT"FILE NUMBER (
0-99)";N
·110 N$=RIGHT$(STR$(N),2):IFN<10THENN$=CHR$(48)+CHR$(N+48
)
·120 F$="BACKUP":PRINT:INPUT"FILENAME";F$:F$=N$+LEFT$(F$,
14):L=LEN(F$)
·130 POKE49458,L:FORJ=1TOL:POKE49458+J,ASC(MID$(F$,J,1)):
NEXTJ:PRINT
·140 PRINT"SAVING DEVICE ** "D$:PRINT"STARTING WITH ** "F
$
·150 PRINT:INPUT"IS THIS CORRECT (Y/N)";B$:IFB$<>"Y"THEN6
0
·160 POKE770,131:POKE771,164:SYS49152:END
·170 DATA169,79,32,210,255,162,38,160,192,204,3,3,1507
·180 DATA208,10,162,131,160,164,169,70,32,210,255,44,1615
·190 DATA169,78,32,210,255,142,2,3,140,3,3,76,1113
·200 DATA36,193,32,96,165,134,122,132,123,32,115,0,1180
·210 DATA170,240,243,162,255,134,58,144,3,76,150,164,1799
·220 DATA32,107,169,32,121,165,173,0,2,240,5,169,1215
·230 DATA79,141,2,3,76,162,164,169,0,133,2,133,1064
·240 DATA251,133,252,133,254,24,101,20,69,254,230,254,197
5
·250 DATA24,101,21,69,254,170,230,254,164,252,185,0,1724
·260 DATA2,133,253,201,34,208,6,165,2,73,255,133,1465
·270 DATA2,201,32,208,4,165,2,240,8,138,24,101,1125
·280 DATA253,69,254,170,44,198,254,230,252,164,253,208,23
49
·290 DATA213,138,41,240,74,74,74,74,24,105,129,141,1327
·300 DATA44,193,138,41,15,24,105,129,141,45,193,162,1230
·310 DATA0,189,43,193,240,12,157,0,4,173,134,2,1147
·320 DATA157,0,216,232,208,239,169,38,141,2,3,173,1578
·330 DATA48,193,240,23,165,161,201,212,176,4,165,160,1748
·340 DATA240,13,238,32,208,160,0,32,225,255,208,6,1617
·350 DATA32,33,193,76,38,192,232,208,242,200,208,239,1893
·360 DATA32,68,229,169,0,168,174,49,193,32,186,255,1555
·370 DATA173,50,193,162,51,160,193,32,189,255,169,43,1670
·380 DATA166,45,164,46,32,216,255,162,1,189,51,193,1520
·390 DATA168,200,152,201,58,144,2,169,48,157,51,193,1543
·400 DATA201,48,208,3,202,16,234,32,33,193,76,116,1362
·410 DATA164,206,32,208,169,0,170,168,76,219,255,160,1827
·420 DATA1,1,160,0,0,65,72,79,89,33,0,0,500
```

## C-128 BUG REPELLENT

```
·10 PRINTCHR$(147)"LOADING AND CHECKING THE DATA[3"."]":J
=4864
·20 FORB=0TO11:READA:IFA<0ORA>255THEN40
·30 POKEJ+B,A:X=X+A:NEXTB:READA:IFA=XTHEN50
·40 PRINT:PRINT"ERROR IN DATA LINE:"PEEK(66)*256+PEEK(65)
:END
·50 X=0:J=J+12:IFJ<5213THEN20
·60 POKE208,0:POKE5213,0:A$="Y":B$=A$:C$="D":D$="DISK":D=
8:PRINTCHR$(147)
·70 INPUT"DO YOU WANT AUTOMATIC SAVES (Y/N)";A$:PRINT:IFA
$="Y"THEN90
·80 PRINT"NO AUTOMATIC SAVES[3"."]":GOTO150
·90 POKE5213,1:INPUT"DISK OR TAPE (D/T)";C$:IFC$<>"D"THEN
D=1:D$="TAPE"
·100 POKE5214,D:D$=D$+" DRIVE":PRINT:INPUT"FILE NUMBER (0
-99)";N
·110 N$=RIGHT$(STR$(N),2):IFN<10THENN$=CHR$(48)+CHR$(N+48
)
·120 F$="BACKUP":PRINT:INPUT"FILENAME";F$:F$=N$+LEFT$(F$,
14):L=LEN(F$)
·130 POKE5215,L:FORJ=1TOL:POKE5215+J,ASC(MID$(F$,J,1)):NE
XTJ:PRINT
·140 PRINT"SAVING DEVICE ** "D$:PRINT"STARTING WITH ** "F
$
·150 PRINT:INPUT"IS THIS CORRECT (Y/N)";B$:IFB$<>"Y"THEN6
0
·160 POKE770,198:POKE771,77:SYS4864:END
·170 DATA32,58,20,169,41,162,19,236,3,3,208,4,955
·180 DATA169,198,162,77,141,2,3,142,3,3,224,19,1143
·190 DATA208,7,32,125,255,79,78,0,96,32,125,255,1292
·200 DATA79,70,70,0,96,162,0,134,251,189,0,2,1053
·210 DATA240,19,201,48,144,9,201,58,176,5,133,251,1485
·220 DATA232,208,238,134,252,165,251,208,3,76,198,77,2042
·230 DATA169,0,166,235,164,236,133,253,133,254,142,47,193
2
·240 DATA20,140,48,20,24,101,22,69,254,230,254,24,1206
·250 DATA101,23,69,254,170,230,254,164,252,185,0,2,1704
·260 DATA133,251,201,34,208,6,165,253,73,255,133,253,1965
·270 DATA201,32,208,4,165,253,240,8,138,24,101,251,1625
·280 DATA69,254,170,44,198,254,230,252,164,251,208,213,23
07
·290 DATA138,41,240,74,74,74,74,24,105,65,141,88,1138
·300 DATA20,138,41,15,24,105,65,141,89,20,32,79,769
·310 DATA20,189,85,20,240,6,32,210,255,232,208,245,1742
·320 DATA174,47,20,172,48,20,24,32,240,255,173,93,1298
·330 DATA20,240,27,165,161,201,212,176,4,165,160,240,1771
·340 DATA17,32,65,20,238,32,208,238,1,214,32,225,1322
·350 DATA255,208,6,32,49,20,76,198,77,232,208,242,1603
·360 DATA200,208,239,32,66,193,173,95,20,162,96,160,1644
·370 DATA20,32,189,255,169,0,170,32,104,255,169,0,1395
·380 DATA174,94,20,168,32,186,255,169,45,174,16,18,1351
·390 DATA172,17,18,32,216,255,162,1,189,96,20,168,1346
·400 DATA200,152,201,58,144,2,169,48,157,96,20,201,1448
·410 DATA48,208,3,202,16,234,32,49,20,141,0,2,955
·420 DATA76,183,77,58,59,32,65,20,206,32,208,206,1222
·430 DATA1,214,169,0,170,168,76,219,255,32,79,20,1403
·440 DATA169,26,141,0,214,173,0,214,16,251,96,162,1462
·450 DATA0,142,0,255,96,19,18,32,32,32,32,146,804
·460 DATA0,1,0,0,65,72,79,89,33,0,0,0,339
```

# FLANKSPEED FOR THE C-64 By GORDON F. WHEAT

*Flankspeed* will allow you to enter machine language *Ahoy!* programs without any mistakes. Once you have typed the program in, save it for future use. While entering an ML program with *Flankspeed* there is no need to enter spaces or hit the carriage return. This is all done automatically. If you make an error in a line a bell will ring and you will be asked to enter it again. To LOAD in a program Saved with *Flankspeed* use LOAD "name",1,1 for tape, or LOAD "name",8,1 for disk. The function keys may be used after the starting and ending addresses have been entered.

f1–SAVEs what you have entered so far.

f3–LOADs in a program worked on previously.

f5–To continue on a line you stopped on after LOADing in the previous saved work.

f7–Scans through the program to locate a particular line, or to find out where you stopped the last time you entered the program. It temporarily freezes the output as well.

```
·100 POKE53280,12:POKE53281,11                                OP
·105 PRINT"[CLEAR][c 8][RVSON][15" "]FLANKSPEED[15" "]";      FP
·110 PRINT"[RVSON][5" "]MISTAKEPROOF ML ENTRY PROGRAM[6" "
]"                                                             JP
·115 PRINT"[RVSON][9" "]CREATED BY G. F. WHEAT[9" "]"         FA
·120 PRINT"[RVSON][3" "]COPR. 1987, ION INTERNATIONAL INC.
[3" "]"                                                        AJ
·125 FORA=54272TO54296:POKEA,0:NEXT                           ND
·130 POKE54272,4:POKE54273,48:POKE54277,0:POKE54278,249:PO
KE54296,15                                                     NP
·135 FORA=680TO699:READB:POKEA,B:NEXT                         FL
·140 DATA169,251,166,253,164,254,32,216,255,96                FF
·145 DATA169,0,166,251,164,252,32,213,255,96                  EK
·150 B$="STARTING ADDRESS IN HEX":GOSUB430:AD=B:SR=B          KP
·155 GOSUB480:IFB=0THEN150                                    OE
·160 POKE251,T(4)+T(3)*16:POKE252,T(2)+T(1)*16                AM
·165 B$="ENDING ADDRESS IN HEX":GOSUB430:EN=B                 PE
·170 GOSUB470:IFB=0THEN150                                    PG
·175 POKE254,T(2)+T(1)*16:B=T(4)+1+T(3)*16                    GM
·180 IFB>255THENB=B-255:POKE254,PEEK(254)+1                   HG
·185 POKE253,B:PRINT                                          EC
·190 REM  GET HEX LINE                                        ED
·195 GOSUB495:PRINT": [c P][LEFT]";:FORA=0TO8                 KD
·200 FORB=0TO1:GOTO250                                        IH
·205 NEXTB                                                    IJ
·210 A%(A)=T(1)+T(0)*16:IFAD+A-1=ENTHEN340                    FA
·215 PRINT" [c P][LEFT]";                                     EG
·220 NEXTA:T=AD-(INT(AD/256)*256):PRINT" "                    II
·225 FORA=0TO7:T=T+A%(A):IFT>255THENT=T-255                   GL
·230 NEXT                                                     GI
·235 IFA%(8)<>TTHENGOSUB375:GOTO195                           FL
·240 FORA=0TO7:POKEAD+A,A%(A):NEXT:AD=AD+8:GOTO195            IM
·245 REM     GET HEX INPUT                                    PA
·250 GETA$:IFA$=""THEN250                                     GA
·255 IFA$=CHR$(20)THEN305                                     GO
·260 IFA$=CHR$(133)THEN535                                    LM
·265 IFA$=CHR$(134)THEN560                                    IG
·270 IFA$=CHR$(135)THENPRINT" ":GOTO620                       HO
·275 IFA$=CHR$(136)THENPRINT" ":GOTO635                       HE
·280 IFA$>"@"ANDA$<"G"THENT(B)=ASC(A$)-55:GOTO295             MI
·285 IFA$>"/"ANDA$<":"THENT(B)=ASC(A$)-48:GOTO295             DJ
·290 GOSUB415:GOTO250                                         JA
·295 PRINTA$"[c P][LEFT]";                                    PK
·300 GOTO205                                                  FA
·305 IFA>0THEN320                                             BI
·310 A=-1:IFB=1THEN330                                        BB
·315 GOTO220                                                  FA
·320 IFB=0THENPRINTCHR$(20);CHR$(20);:A=A-1                   BF
·325 A=A-1                                                    FK
·330 PRINTCHR$(20);:GOTO220                                   PH
·335 REM LAST LINE                                            CP
·340 PRINT" ":T=AD-(INT(AD/256)*256)                          KH
·345 FORB=0TOA-1:T=T+A%(B):IFT>255THENT=T-255                 OD
·350 NEXT                                                     OB
·355 IFA%(A)<>TTHENGOSUB375:GOTO195                           LH
·360 FORB=0TOA-1:POKEAD+B,A%(B):NEXT                          BO
·365 PRINT:PRINT"YOU ARE FINISHED!":GOTO535                   MB
·370 REM BELL AND ERROR MESSAGES                              LM
·375 PRINT:PRINT"LINE ENTERED INCORRECTLY":PRINT:GOTO415      JK
·380 PRINT:PRINT"INPUT A 4 DIGIT HEX VALUE!":GOTO415          PG
·385 PRINT:PRINT"ENDING IS LESS THAN STARTING!":B=0:GOTO41
5                                                              IK
·390 PRINT:PRINT"ADDRESS NOT WITHIN SPECIFIED RANGE!":B=0:
GOTO415                                                        HK
·395 PRINT:PRINT"NOT ZERO PAGE OR ROM!":B=0:GOTO415           DM
·400 PRINT"?ERROR IN SAVE":GOTO415                            JK
·405 PRINT"?ERROR IN LOAD":GOTO415                            IO
·410 PRINT:PRINT:PRINT"END OF ML AREA":PRINT                  JO
·415 POKE54276,17:POKE54276,16:RETURN                         BF
·420 OPEN15,8,15:INPUT#15,A,A$:CLOSE15:PRINTA$:RETURN         DH
·425 REM GET FOUR DIGIT HEX                                   IM
·430 PRINT:PRINTB$;:INPUTT$                                   OL
·435 IFLEN(T$)<>4THENGOSUB380:GOTO430                         JD
·440 FORA=1TO4:A$=MID$(T$,A,1):GOSUB450:IFT(A)=16THENGOSUB
380:GOTO430                                                    AK
·445 NEXT:B=(T(1)*4096)+(T(2)*256)+(T(3)*16)+T(4):RETURN      KB
·450 IFA$>"@"ANDA$<"G"THENT(A)=ASC(A$)-55:RETURN              GM
·455 IFA$>"/"ANDA$<":"THENT(A)=ASC(A$)-48:RETURN              NJ
·460 T(A)=16:RETURN                                           IC
·465 REM ADDRESS CHECK                                        OL
·470 IFAD>ENTHEN385                                           HO
·475 IFB<SRORB>ENTHEN390                                      LE
·480 IFB<256OR(B>40960ANDB<49152)ORB>53247THEN395             OB
·485 RETURN                                                   HE
·490 REM ADDRESS TO HEX                                       PM
·495 AC=AD:A=4096:GOSUB520                                    AP
·500 A=256:GOSUB520                                           NF
·505 A=16:GOSUB520                                            LG
·510 A=1:GOSUB520                                             HE
·515 RETURN                                                   JD
·520 T=INT(AC/A):IFT>9THENA$=CHR$(T+55):GOTO530               OC
·525 A$=CHR$(T+48)                                            JI
·530 PRINTA$;:AC=AC-A*T:RETURN                                AA
·535 A$="**SAVE**":GOSUB585                                   IC
·540 OPEN1,T,1,A$:SYS680:CLOSE1                               AB
·545 IFST=0THENEND                                            FB
·550 GOSUB400:IFT=8THENGOSUB420                               PM
·555 GOTO535                                                  FI
·560 A$="**LOAD**":GOSUB585                                   PE
·565 OPEN1,T,0,A$:SYS690:CLOSE1                               PO
·570 IFST=64THEN195                                           OI
·575 GOSUB405:IFT=8THENGOSUB420                               CO
·580 GOTO560                                                  GN
·585 PRINT" ":PRINTTAB(14)A$                                  KA
·590 PRINT:A$="":INPUT"FILENAME";A$                           IO
·595 IFA$=""THEN590                                           HK
·600 PRINT:PRINT"TAPE OR DISK?":PRINT                         HL
·605 GETB$:T=1:IFB$="D"THENT=8:A$="@0:"+A$:RETURN             NP
·610 IFB$<>"T"THEN605                                         KO
·615 RETURN                                                   PH
·620 B$="CONTINUE FROM ADDRESS":GOSUB430:AD=B                 DD
·625 GOSUB475:IFB=0THEN620                                    NK
·630 PRINT:GOTO195                                            HN
·635 B$="BEGIN SCAN AT ADDRESS":GOSUB430:AD=B                 FK
·640 GOSUB475:IFB=0THEN635                                    LN
·645 PRINT:GOTO670                                            HI
·650 FORB=0TO7:AC=PEEK(AD+B):GOSUB505:IFAD+B=ENTHENAD=SR:G
OSUB410:GOTO195                                                LM
·655 PRINT" ";:NEXTB                                          LE
·660 PRINT:AD=AD+8                                            CD
·665 GETB$:IFB$=CHR$(136)THEN195                              JD
·670 GOSUB495:PRINT": ";:GOTO650                              KE
```

# KERNAL POWER

## FROM PAGE 20

**HELPKEY.ASM**

```
1 :"helpkey.asm
2 :" ORG $1300
3 :"
4 :"PFKEY  EQU $FF65
5 :"CHRGET EQU $0380
6 :"CHRGOT EQU $0386
7 :"VECTOR EQU $FB
8 :"PRIMM  EQU $FF7D
9 :"BSOUT  EQU $FFD2
10 :"GETIN EQU $FFE4
11 :"CONFIG EQU $FF00
12 :"RUNMOD EQU $7F
13 :"
14 :"WEDGE LDA #$8D ;STA $FF01
15 :"       STA CHRGET
16 :"       LDA #$01
17 :"       STA CHRGET+1
18 :"       LDA #$FF
19 :"       STA CHRGET+2
20 :"       LDA #$4C ;JMP START
21 :"       STA CHRGET+3
22 :"       LDA #<START
23 :"       STA CHRGET+4
24 :"       LDA #>START
25 :"       STA CHRGET+5
26 :"       RTS
27 :"
28 :"START INC $3D
29 :"       BNE S1
30 :"       INC $3E
31 :"S1     JSR CHRGOT
32 :"       CMP #$A8 ;CMDR-EP?
33 :"       BEQ MAIN ;YES
34 :"       JMP CHRGOT ;NO
35 :"
36 :"MAIN   LDA RUNMOD ;PRGM MODE?
37 :"       BNE EXIT ;YES, QUIT
38 :"       PHA ;SAVE REG'S
39 :"       TYA
40 :"       PHA
41 :"       TXA
42 :"       PHA
43 :"       LDA #0
44 :"       STA COUNT
45 :"       STA CONFIG ;BANK 15
46 :"LOOP   JSR PRIMM ;PRINT CURSOR
47 :"       DFB $A4,$9D,$00
48 :"KEY    JSR GETIN ;GET KEY
49 :"       BEQ KEY ;NO KEY YET
50 :"       CMP #$A8 ;CMDR-EP?
51 :"       BEQ DONE ;YES
52 :"       CMP #$A9 ;SHIFT-EP?
53 :"       SEC
54 :"       BEQ QUIT ;YES, ABORT
55 :"       LDY COUNT ;NO
56 :"       STA STORE,Y  ;SAVE IT
57 :"       INY
58 :"       STY COUNT    ;UPDATE COUNT
59 :"       JSR PRIMM ;BLANK CURSOR
60 :"       DFB $20,$9D,$00
61 :"       JSR BSOUT ;DISPLAY IT
62 :"       JMP LOOP ;GET NEXT
63 :"
64 :"DONE   LDA #<STORE ;LSB
65 :"       STA VECTOR  ;ZERO PAGE
66 :"       LDA #>STORE ;MSB
67 :"       STA VECTOR+1
68 :"       LDA #$0F ;BANK 15
69 :"       STA VECTOR+2
70 :"       LDA #VECTOR
71 :"       LDX #10 ;HELP KEY
72 :"       LDY COUNT
73 :"       JSR PFKEY ;DEFINE KEY
74 :"QUIT   PLA ;RESTORE REG'S
75 :"       TAX
76 :"       PLA
77 :"       TAY
78 :"       PLA
79 :"       BCC EXIT
80 :"
81 :"ERR    JSR PRIMM
82 :"       DFB $07,$0D
83 :"       ASC 'ABORT',00
84 :"
85 :"EXIT   JMP CHRGOT
86 :"
87 :"COUNT DFB 0
88 :"STORE DFB 0 ;BEGIN HERE
```

**HELPKEY.MON**

```
1 REM ----------------------------------
2 REM           HELPKEY.MON
3 REM         RUPERT REPORT #41
4 REM      C-128 (SEE TEXT FIRST)
5 REM ----------------------------------
6 REM - ENTER MONITOR THEN TYPE:
7 REM -  A 1300 LDA #$8D   <RETURN>
8 REM -         STA $0380  <RETURN>
9 REM -         LDA #$01   <RETURN>
10 REM -  AND SO FORTH FOR THE
11 REM -  FOLLOWING LINES ...
12 REM ================================
14 . 01300  A9 8D     LDA #$8D
15 . 01302  8D 80 03 STA $0380
16 . 01305  A9 01     LDA #$01
```

```
17 . 01307  8D 81 03 STA $0381
18 . 0130A  A9 FF    LDA #$FF
19 . 1030C  8D 82 03 STA $0382
20 . 0130F  A9 4C    LDA #$4C
21 . 01311  8D 83 03 STA $0383
22 . 01314  A9 1F    LDA #$1F
23 . 01316  8D 84 03 STA $0384
24 . 01319  A9 13    LDA #$13
25 . 0131B  8D 85 03 STA $0385
26 . 0131E  60       RTS
27 .
28 . 0131F  E6 3D    INC $3D
29 . 01321  D0 02    BNE $1325
30 . 01323  E6 3E    INC $3E
31 . 01325  20 86 03 JSR $0386
32 . 01328  C9 A8    CMP #$A8
33 . 0132A  F0 03    BEQ $132F
34 . 0132C  4C 86 03 JMP $0386
35 .
36 . 0132F  A5 7F    LDA $7F
37 . 01331  D0 5F    BNE $1392
38 . 01333  48       PHA
39 . 01334  98       TYA
40 . 01335  48       PHA
41 . 01336  8A       TXA
42 . 01337  48       PHA
43 . 01338  A9 00    LDA #$00
44 . 0133A  8D 95 13 STA $1395
45 . 0133D  8D 00 FF STA $FF00
46 . 01340  20 7D FF JSR $FF7D
47 . 01343  A4 9D    LDY $9D
48 . 01345  00       BRK
49 . 01346  20 E4 FF JSR $FFE4
50 . 01349  F0 FB    BEQ $1346
51 . 0134B  C9 A8    CMP #$A8
52 . 0134D  F0 1B    BEQ $136A
53 . 0134F  C9 A9    CMP #$A9
54 . 01351  38       SEC
55 . 01352  F0 2C    BEQ $1380
56 . 01354  AC 95 13 LDY $1395
57 . 01357  99 96 13 STA $1396,Y
58 . 0135A  C8       INY
59 . 0135B  8C 95 13 STY $1395
60 . 0135E  20 7D FF JSR $FF7D
61 . 01361  20 9D 00 JSR $009D
62 . 01364  20 D2 FF JSR $FFD2
63 . 01367  4C 40 13 JMP $1340
64 . 0136A  A9 96    LDA #$96
65 . 0136C  85 FB    STA $FB
66 . 0136E  A9 13    LDA #$13
67 . 01370  85 FC    STA $FC
68 . 01372  A9 0F    LDA #$0F
69 . 01374  85 FD    STA $FD
70 . 01376  A9 FB    LDA #$FB
71 . 01378  A2 0A    LDX #$0A
72 . 0137A  AC 95 13 LDY $1395
73 . 0137D  20 65 FF JSR $FF65
74 . 01380  68       PLA
75 . 01381  AA       TAX
76 . 01382  68       PLA
77 . 01383  A8       TAY
78 . 01384  68       PLA
79 . 01385  90 0B    BCC $1392
80 .
81 . 01387  20 7D FF JSR $FF7D
82 .*** MUST FIX LINES 83, 85-87 ***
83 . 0138A  EA       NOP
84 . 0138B  0D 41 42 ORA $4241
85 . 0138E  EA       NOP
86 . 0138F  EA       NOP
87 . 01390  EA       NOP
88 . 01391  00       BRK
89 . 01392  4C 86 03 JMP $0386
90 . 01395  00       BRK
91 . 01396  00       BRK
```

### HELPKEY BASIC LOADER

```
·1 REM-----------------------------                DG
·2 REM  HELPKEY BASIC LOADER                       LP
·3 REM     RUPERT REPORT #41                       MD
·4 REM          C-128                              JC
·5 REM-----------------------------                HK
·10 PRINT" LOADING 'HELPKEY' ROUTINE[3"."
]"                                                 JK
·20 M=DEC("1300")                                  DE
·30 READ B$                                        AI
·40 IF B$="XX" THEN 100                            PO
·50 B=DEC(B$)                                      KL
·60 CK=CK+B  :REM CHECKSUM                         PK
·70 POKE M,B                                       JH
·80 M=M+1                                          HP
·90 GOTO 30                                        EL
·100 IF CK<>17546 THEN PRINT "DATA ERROR"
 :STOP                                             PG
·110 PRINT" 'HELPKEY' ROUTINE IS LOADED"           CH
·120 PRINT : PRINT "ASSIGN KEYSTROKES TO
HELP KEY :"                                        NF
·130 PRINT"  PRESS CMDR-[EP] <RETURN> TO
BEGIN"                                             GI
·140 PRINT"  TYPE DESIRED KEYSTROKES"              PG
·150 PRINT"  PRESS  CMDR-[EP]  TO END"             PF
·160 PRINT"  (PRESS SHIFT-[EP] TO ABORT)"          FH
·170 SYS DEC("1300")                               GK
·180 END                                           DE
·190 DATA A9,8D,8D,80,03,A9,01,8D                  FI
·200 DATA 81,03,A9,FF,8D,82,03,A9                  JP
·210 DATA 4C,8D,83,03,A9,1F,8D,84                  HA
·220 DATA 03,A9,13,8D,85,03,60                     KM
·230 DATA E6,3D,D0,02,E6,3E,20,86                  CD
·240 DATA 03,C9,A8,F0,03,4C,86,03                  LP
·250 DATA A5,7F,D0,5F,48,98,48,8A                  DO
·260 DATA 48,A9,00,8D,95,13,8D,00                  EH
·270 DATA FF,20,7D,FF,A4,9D,00,20                  JK
·280 DATA E4,FF,F0,FB,C9,A8,F0,1B                  PK
·290 DATA C9,A9,38,F0,2C,AC,95,13                  KB
·300 DATA 99,96,13,C8,8C,95,13,20                  KO
```

```
•310 DATA 7D,FF,20,9D,00,20,D2,FF    CH
•320 DATA 4C,40,13,A9,96,85,FB,A9    HI
•330 DATA 13,85,FC,A9,0F,85,FD,A9    NA
•340 DATA FB,A2,0A,AC,95,13,20,65    MI
•350 DATA FF,68,AA,68,A8,68,90,0B    KL
•360 DATA 20,7D,FF,07,0D,41,42,4F    AA
•370 DATA 52,54,00,4C,86,03,00,00    AF
•400 DATA XX                         MD
```

# WALL CRAWLER
## FROM PAGE 34

**Starting address in hex: C000**
**Ending address in hex: CA11**
**SYS to start: 49152**

***Flankspeed*** **required for entry! See page 85.**

```
C000: A9 08 20 D2 FF 20 D5 C4 5F
C008: A9 D2 85 39 A9 C6 85 3A 73
C010: A9 C0 85 3B A9 70 85 3C 17
C018: A2 0D A0 00 B1 39 91 3B 20
C020: C8 C0 40 90 F7 18 98 65 88
C028: 39 85 39 A5 3A 69 00 85 EE
C030: 3A 18 98 65 3B 85 3B A5 22
C038: 3C 69 00 85 3C CA D0 DA 16
C040: A0 18 B9 BE C5 99 00 D4 A5
C048: 88 10 F7 78 A9 7F 8D 0D 15
C050: DC A9 01 8D 1A D0 8D 12 EF
C058: D0 A9 1B 8D 11 D0 A9 37 3E
C060: 8D 14 03 A9 C5 8D 15 03 1A
C068: 58 A9 00 8D 17 D0 8D 1B 88
C070: D0 8D 1D D0 A9 FF 8D 1C 10
C078: D0 A9 0A 8D 27 D0 A9 03 2F
C080: 8D 26 D0 A9 07 8D 25 D0 39
C088: A9 05 8D 2E D0 A9 C3 8D BE
C090: FF 77 A9 0F 8D 20 D0 A9 E8
C098: 1A A0 C6 20 1E AB A9 33 E0
C0A0: 8D 2C 74 20 B7 C3 A9 01 15
C0A8: 8D 5E C5 20 59 C4 A9 00 42
C0B0: 85 05 8D 65 C5 8D 5F C5 A6
C0B8: 8D 61 C5 8D 62 C5 85 06 AE
C0C0: 8D 0E D0 8D 0F D0 8D 10 38
C0C8: D0 A9 9B 8D 64 C5 20 AD 64
C0D0: C2 20 2B C3 A9 FF 8D 15 EE
C0D8: D0 A9 63 8D 60 C5 20 EA 75
C0E0: C1 A2 FE 8E 01 D0 8E 63 96
C0E8: C5 A9 05 20 51 C4 38 AD 79
C0F0: F8 77 E9 01 29 03 09 C8 4A
C0F8: 8D F8 77 CA CA E0 E2 B0 01
C100: E2 AD 1E D0 AD 8D 02 D0 8D
C108: FB E6 03 A5 05 F0 05 C6 55
C110: 05 4C 25 C1 38 A9 1A ED 32
C118: 5E C5 85 05 20 D8 C2 20 A2
C120: 13 C4 20 8D C2 AD 5F C5 3B
C128: F0 16 A5 03 29 03 D0 50 25
C130: AD 63 C5 49 FF 8D 01 D4 B3
C138: EE 63 C5 D0 43 4C A8 C1 1B
C140: A5 03 29 1F D0 13 20 36 6B
C148: C2 20 FF C1 AD 63 C5 C9 8D
C150: 42 B0 06 20 62 C3 4C AB 87
C158: C0 AD 1E D0 29 01 D0 0F BF
C160: 20 E4 C3 C9 44 F0 08 20 50
C168: DE C1 AD 60 C5 D0 11 A9 68
C170: CE 8D F8 77 A2 10 8E 04 82
C178: D4 E8 8E 04 D4 8E 5F C5 51
C180: A2 02 A0 DC C8 D0 FD CA 05
C188: D0 FA 20 2B C3 A5 03 29 35
C190: 1F D0 12 A2 05 18 BD F9 0A
C198: 77 69 01 29 03 09 C4 9D 12
C1A0: F9 77 CA 10 F0 4C 04 C1 EF
C1A8: CE 2C 74 AD 2C 74 29 0F 9E
C1B0: F0 03 4C AB C0 A9 00 8D 94
C1B8: 15 D0 8D 04 D4 EE 86 02 7C
C1C0: A2 0D A0 08 18 20 F0 FF 42
C1C8: A9 68 A0 C6 20 1E AB A9 D5
C1D0: 0E 20 51 C4 AD 00 DC 29 C8
C1D8: 10 D0 E2 4C 9E C0 A5 03 F0
C1E0: 29 7F D0 1A CE 60 C5 AD 17
C1E8: 60 C5 A2 30 C9 0A 90 06 4C
C1F0: E9 0A E8 4C EC C1 8E 3C 93
C1F8: 74 09 30 8D 3D 74 60 AD F3
C200: 61 C5 F0 04 CE 61 C5 60 72
C208: AD 62 C5 0A 18 6D 62 C5 95
C210: A8 B9 D7 C5 D0 04 8D 62 D4
C218: C5 60 8D 61 C5 A2 40 8E 64
C220: 04 D4 B9 D8 C5 8D 01 D4 B4
C228: B9 D9 C5 8D 00 D4 E8 8E 5B
C230: 04 D4 EE 62 C5 60 AD 65 93
C238: C5 D0 1D A0 03 AD 00 DC 1A
C240: 29 0F D9 A6 C5 F0 09 88 41
C248: 10 F8 A9 CC 8D F8 77 60 26
C250: 84 04 B9 92 C5 8D 65 C5 A3
C258: A4 04 18 AD 63 C5 79 96 FF
C260: C5 C9 E4 B0 24 8D 63 C5 60
C268: 18 AD 64 C5 79 9A C5 C9 FB
C270: 53 90 16 C9 FC B0 12 8D 81
C278: 64 C5 18 AD F8 77 79 9E F0
C280: C5 29 03 19 A2 C5 8D F8 7A
C288: 77 CE 65 C5 60 AD 0F D0 E7
C290: C9 41 B0 12 AD 1B D4 29 25
C298: 07 0D 5F C5 D0 0E AD 64 C2
C2A0: C5 8D 0E D0 A9 41 18 69 3F
C2A8: 02 8D 0F D0 60 A2 05 AD CD
C2B0: 1B D4 09 60 9D 66 C5 9D 71
C2B8: 6C C5 A9 01 9D 72 C5 20 8B
C2C0: 0C C3 AD 1B D4 29 03 09 63
C2C8: C4 9D F9 77 AD 1B D4 09 43
C2D0: 08 9D 28 D0 CA 10 D8 60 83
C2D8: A2 05 AD 1B D4 F0 0B 18 32
C2E0: BD 66 C5 7D 78 C5 C9 44 94
C2E8: B0 06 20 0C C3 4C 08 C3 A7
C2F0: 9D 66 C5 18 BD 6C C5 7D 40
C2F8: 7E C5 9D 6C C5 BD 72 C5 03
C300: 7D 84 C5 29 01 9D 72 C5 C7
C308: CA 10 CF 60 AD 1B D4 29 D9
C310: 03 A8 B9 AA C5 9D 78 C5 C1
```

```
C318: AD 1B D4 29 03 A8 B9 AA EE
C320: C5 9D 7E C5 B9 AE C5 9D 93
C328: 84 C5 60 A2 05 8A 0A A8 B7
C330: BD 66 C5 99 03 D0 BD 6C B1
C338: C5 99 02 D0 AD 10 D0 3D 36
C340: B8 C5 A8 BD 72 C5 29 01 87
C348: F0 05 98 1D B2 C5 A8 8C A1
C350: 10 D0 CA 10 D8 AD 64 C5 BC
C358: 8D 00 D0 AD 63 C5 8D 01 1C
C360: D0 60 A0 00 98 29 03 85 7C
C368: 06 09 1C 8D 01 D4 A2 10 A9
C370: 8E 04 D4 E8 8E 04 D4 A9 D1
C378: 06 20 51 C4 C8 C0 14 90 E2
C380: E3 AE 5E C5 A0 02 20 9D 97
C388: C3 AE 60 C5 A0 04 20 9D 83
C390: C3 AC 5E C5 C8 C0 12 B0 71
C398: 03 8C 5E C5 60 84 02 A4 D7
C3A0: 02 38 B9 32 74 69 00 C9 6E
C3A8: 3A 90 02 A9 30 99 32 74 8F
C3B0: 88 10 EF CA D0 E9 60 A0 BF
C3B8: 00 B9 32 74 D9 42 74 F0 9A
C3C0: 05 B0 0B 4C D9 C3 C8 C0 F4
C3C8: 05 90 EE 4C D9 C3 A0 04 DB
C3D0: B9 32 74 99 42 74 88 10 1A
C3D8: F7 A0 04 A9 30 99 32 74 8F
C3E0: 88 10 FA 60 A9 00 85 FD 02
C3E8: A9 74 85 FE 38 AD 63 C5 9A
C3F0: E9 34 4A 4A 4A A8 18 A5 54
C3F8: FD 69 28 85 FD A5 FE 69 1A
C400: 00 85 FE 88 D0 F0 38 AD B4
C408: 64 C5 E9 0F 4A 4A 4A A8 B2
C410: B1 FD 60 AD 1B D4 29 0F F5
C418: C9 0B 90 02 E9 0B 0A A8 27
C420: C8 A9 57 85 3B A9 74 85 4E
C428: 3C 18 A5 3B 69 28 85 3B AF
C430: A5 3C 69 00 85 3C 88 D0 96
C438: F0 AD 1B D4 29 07 AA BC 5E
C440: 8A C5 18 B1 3B 69 01 29 29
C448: 07 09 40 91 3B C8 91 3B FA
C450: 60 18 65 A2 C5 A2 D0 FC 07
C458: 60 A9 57 85 3B 85 FB A9 A5
C460: 74 85 3C A9 D8 85 FC A9 45
C468: 16 85 02 A0 18 A5 02 29 8F
C470: 01 D0 0E A9 49 91 3B A9 B9
C478: 06 91 FB 88 10 F5 4C A5 8C
C480: C4 A9 48 91 3B A9 06 91 45
C488: FB 88 A9 40 91 3B 88 91 DD
C490: 3B C8 A9 0C 91 FB 88 91 F1
C498: FB 88 A9 48 91 3B A9 06 8B
C4A0: 91 FB 88 10 E5 18 A5 3B A5
C4A8: 69 28 85 3B 85 FB A5 3C 5E
C4B0: 69 00 85 3C 18 69 64 85 47
C4B8: FC C6 02 10 AE A2 01 8E 6F
C4C0: 86 02 A0 23 18 20 F0 FF 36
C4C8: AE 5E C5 A9 00 20 CD BD F0
C4D0: A9 20 4C D2 FF AD 0E DC 52
C4D8: 29 FE 8D 0E DC A5 01 29 49
C4E0: FB 85 01 A9 D0 85 3A A9 47
C4E8: 78 85 3C A0 00 84 39 84 06
C4F0: 3B A2 08 B1 39 91 3B C8 57
C4F8: D0 F9 E6 3A E6 3C CA D0 A3
C500: F2 A5 01 09 04 85 01 AD DA
C508: 0E DC 09 01 8D 0E DC A0 16
C510: 4F B9 82 C6 99 00 7A 88 FE
C518: 10 F7 AD 02 DD 09 03 8D 47
C520: 02 DD AD 00 DD 29 FC 09 BA
C528: 02 8D 00 DD A9 DE 8D 18 C3
C530: D0 A9 74 8D 88 02 60 A9 41
C538: 01 8D 19 D0 A2 42 A0 0F 45
C540: AD 12 D0 C9 42 90 04 A2 14
C548: 01 A4 06 8E 12 D0 8C 21 13
C550: D0 AD 0D DC 29 01 F0 03 D6
C558: 4C 31 EA 4C BC FE 00 00 C8
C560: 00 00 00 00 00 00 00 00 60
C568: 00 00 00 00 00 00 00 00 68
C570: 00 00 00 00 00 00 00 00 70
C578: 00 00 00 00 00 00 00 00 78
C580: 00 00 00 00 00 00 00 00 80
C588: 00 00 01 04 07 0A 0D 10 BB
C590: 13 16 08 08 0C 0C FE 02 E2
C598: 00 00 00 00 FE 02 FF 01 9A
C5A0: FF 01 C8 C8 CC CC 0E 0D E7
C5A8: 0B 07 01 FF 02 FE 00 FF BC
C5B0: 00 FF 02 04 08 10 20 40 2F
C5B8: FD FB F7 EF DF BF 00 00 3A
C5C0: 08 07 00 1A 0A 00 00 00 F3
C5C8: 00 00 00 00 FF FF 00 00 C8
C5D0: 80 00 00 00 00 00 8F 03 E3
C5D8: 09 68 01 08 60 01 0A 88 47
C5E0: 03 09 68 01 08 60 01 0A C9
C5E8: 88 03 09 68 01 08 60 01 50
C5F0: 0A 88 01 09 68 01 0A 88 89
C5F8: 01 09 68 01 0A 88 01 0A 0A
C600: 88 01 09 68 03 08 60 03 69
C608: 09 68 03 08 60 03 09 68 59
C610: 01 08 60 04 09 68 03 08 F9
C618: 60 00 93 20 20 1C 4C 49 FD
C620: 56 45 53 20 20 20 9C 53 5F
C628: 43 4F 52 45 20 20 20 95 48
C630: 54 49 4D 45 52 20 20 20 13
C638: 1F 48 49 47 48 20 20 20 D8
C640: 81 4C 45 56 45 4C 0D 05 4D
C648: 20 20 20 20 33 20 20 20 5C
C650: 20 20 30 30 30 30 30 20 A1
C658: 20 20 20 30 30 30 20 20 89
C660: 20 20 30 30 30 30 30 00 91
C668: 12 20 20 20 50 52 45 53 16
C670: 53 20 46 49 52 45 20 42 6D
C678: 55 54 54 4F 4E 20 20 20 74
C680: 92 00 FF FF FF FF 00 00 13
C688: 00 00 FF FF FF FF FF 00 88
C690: 00 00 FF FF FF FF FF FF 90
C698: 00 00 FF FF FF FF FF FF 98
C6A0: FF 00 FF FF FF FF FF FF A0
C6A8: FF FF FF FF FF FF FF FF A8
C6B0: FF 00 FF FF FF FF FF FF B0
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C6B8: 00 00 FF FF FF FF FF 00 B8
C6C0: 00 00 7E 7E 7E 7E 7E 7E B7
C6C8: 7E 7E 00 FF FF FF FF FF C5
C6D0: FF 00 00 00 00 00 00 00 D0
C6D8: 00 10 00 00 74 00 00 10 6D
C6E0: 80 08 02 00 02 22 00 02 91
C6E8: 22 00 00 A8 00 00 00 00 B3
C6F0: 03 FF 00 00 FC 00 00 FC ED
C6F8: 00 00 FC 00 00 00 00 00 F5
C700: 00 00 00 00 00 00 00 00 00
C708: 00 00 00 00 00 00 00 00 08
C710: 00 00 00 00 00 00 00 00 10
C718: 00 00 00 00 00 00 00 00 18
C720: 00 00 00 00 00 00 00 00 20
C728: 00 00 00 00 00 03 C3 C0 AF
C730: 0E 96 B0 38 00 2C C0 41 EB
C738: 03 00 00 00 00 00 00 00 3B
C740: 00 00 00 00 00 00 00 00 40
C748: 00 00 00 00 00 00 00 00 48
C750: 00 00 00 00 00 00 00 00 50
C758: 00 00 00 00 00 00 00 00 58
C760: 00 00 00 00 00 00 00 00 60
C768: 00 00 0F 00 F0 3A C3 AC 13
C770: C2 96 83 00 00 00 00 41 8E
C778: 00 00 00 00 00 00 00 00 78
C780: 00 00 00 00 00 00 00 00 80
C788: 00 00 00 00 00 00 00 00 88
C790: 00 00 00 00 00 00 00 00 90
C798: 00 00 00 00 00 00 00 00 98
C7A0: 00 00 00 00 C0 00 03 30 94
C7A8: 00 0C 0F 00 F0 0A C3 A0 23
C7B0: 02 96 80 00 00 00 00 41 0B
C7B8: 00 00 00 00 00 00 00 00 B8
C7C0: 00 00 00 00 00 00 00 00 C0
C7C8: 00 00 00 00 00 00 00 00 C8
C7D0: 00 00 00 00 00 00 00 00 D0
C7D8: 00 00 00 00 00 00 00 00 D8
C7E0: 00 00 00 00 00 00 00 00 E0
C7E8: 00 00 0F 00 F0 3A C3 AC 93
C7F0: C2 96 83 00 00 00 00 41 0F
C7F8: 00 00 00 00 00 00 00 00 F8
C800: 00 00 00 00 00 00 00 00 00
C808: 00 00 00 00 00 00 00 00 08
C810: 00 00 00 00 A0 00 00 00 B0
C818: 00 00 50 0A 28 50 00 28 13
C820: 40 05 01 40 05 55 00 01 02
C828: 55 00 00 14 00 00 14 00 A5
C830: 00 00 00 00 3C 00 03 FF 6F
C838: 00 03 FF 00 03 0F C0 0F 1D
C840: 03 C0 03 03 C0 00 03 C0 8E
C848: 00 03 C0 00 00 F0 00 00 FC
C850: C0 00 00 00 00 0A 00 A0 BB
C858: 00 00 00 05 28 50 05 28 03
C860: 50 05 00 50 01 55 40 00 9C
C868: 55 00 00 14 00 00 14 00 E5
C870: 00 00 00 00 3C 00 00 FF AC
C878: 00 00 FF 00 03 C3 C0 03 03
C880: C3 C0 03 C3 C0 0F 00 F0 8C
C888: 03 00 C0 00 00 00 00 00 4C
C890: 00 00 0A 00 00 00 00 00 9A
C898: 05 00 00 05 28 A0 01 28 94
C8A0: 00 01 40 50 00 55 50 00 D7
C8A8: 55 40 00 14 00 00 14 00 66
C8B0: 00 00 00 00 3C 00 00 FF EC
C8B8: C0 00 FF C0 03 F0 C0 03 F1
C8C0: C0 F0 03 C0 C0 03 C0 00 BA
C8C8: 03 C0 00 0F 00 00 03 00 9E
C8D0: 00 00 00 00 00 0A 00 A0 7B
C8D8: 00 00 00 05 28 50 05 28 83
C8E0: 50 05 00 50 01 55 40 00 1D
C8E8: 55 00 00 14 00 00 14 00 66
C8F0: 00 00 00 00 3C 00 00 FF 2D
C8F8: 00 00 FF 00 03 C3 C0 03 83
C900: C3 C0 03 C3 C0 0F 00 F0 0C
C908: 03 00 C0 00 00 00 00 00 CB
C910: 00 00 00 00 00 0A 00 A0 BA
C918: 00 00 00 05 00 50 05 00 72
C920: 50 05 28 50 01 28 40 01 58
C928: 41 40 00 55 00 00 55 00 54
C930: 00 14 00 00 14 00 00 00 58
C938: 00 00 3C 00 00 FF 00 00 74
C940: FF 00 03 C3 C0 03 C3 C0 4F
C948: 03 C3 C0 0F 00 F0 03 00 D2
C950: C0 00 00 00 00 28 00 00 39
C958: 00 00 00 14 00 00 04 28 98
C960: 00 05 28 02 01 40 06 01 D7
C968: 55 54 00 55 50 00 15 00 CC
C970: 00 14 00 00 00 00 00 3F C3
C978: 00 00 3F C0 00 3F C0 00 78
C980: 30 F0 00 3C 30 00 3C 3C 86
C988: 00 0C 0C 00 0C 0F 00 0F CA
C990: 00 00 00 00 00 A0 00 0A 3B
C998: 00 00 00 50 28 05 14 28 52
C9A0: 14 05 00 50 01 55 40 00 A0
C9A8: 55 00 00 14 00 00 14 00 26
C9B0: 00 00 00 00 3C 00 00 FF EC
C9B8: 00 00 FF 00 03 C3 C0 03 43
C9C0: C3 C0 03 00 C0 0F 00 F0 09
C9C8: 3C 00 3C 0C 00 30 00 00 7D
C9D0: 00 00 00 00 00 00 00 28 F8
C9D8: 00 00 00 00 00 14 00 28 15
C9E0: 10 80 28 50 90 01 40 15 D0
C9E8: 55 40 05 55 00 00 54 00 2D
C9F0: 00 14 00 00 00 00 00 FC 02
C9F8: 00 03 FC 00 03 FC 00 0F 08
CA00: 0C 00 0C 3C 00 3C 3C 00 CC
CA08: 30 30 00 F0 30 00 00 F0 7A
CA10: 00 00 10
```

## PROBLEMS ENTERING AN *AHOY!* PROGRAM?

We'd love to help. Call 212-239-6089; if busy or no answer after three rings call 212-239-0855.

# SCAVENGER HUNT
## FROM PAGE 63

**Starting address in hex: C000**
**Ending address in hex: CFF7**
**SYS to start: 49152**

***Flankspeed*** **required for entry! See page 85.**

```
C000: 4C 3F CF 00 00 60 AD 00 69
C008: DC C9 7F F0 06 8D 03 C0 76
C010: 4C 6F C1 AD 01 DC C9 FF E2
C018: F0 EB 8D 04 C0 C9 FE D0 E0
C020: 03 4C 41 C0 C9 FD D0 03 0D
C028: 4C A9 C0 C9 FB D0 03 4C C4
C030: 0B C1 C9 F7 D0 03 4C 2F 0E
C038: C1 C9 EF D0 03 4C 53 C1 E8
C040: 60 AD E2 C2 C9 00 D0 01 8F
C048: 60 AD E2 C2 C9 06 B0 03 7F
C050: 4C 85 C0 C9 0B B0 03 4C B7
C058: 8F C0 C9 10 B0 03 4C 85 08
C060: C0 C9 15 B0 03 4C 8F C0 50
C068: C9 1A B0 03 4C 85 C0 C9 5C
C070: 1F B0 03 4C 8F C0 C9 24 CD
C078: B0 03 4C 85 C0 C9 29 B0 62
C080: 03 4C 8F C0 60 AD E1 C2 D2
C088: C9 1B D0 F8 4C 9D C0 AD 8F
C090: E1 C2 C9 0B D0 03 4C 9D C7
C098: C0 C9 2A D0 E7 A9 E2 8D 20
C0A0: F8 07 CE E2 C2 20 42 C3 3B
C0A8: 60 AD E2 C2 C9 28 D0 01 20
C0B0: 60 C9 23 90 03 4C F1 C0 90
C0B8: C9 1E 90 03 4C E7 C0 C9 F2
C0C0: 19 90 03 4C F1 C0 C9 14 4A
C0C8: 90 03 4C E7 C0 C9 0F 90 BA
C0D0: 03 4C F1 C0 C9 0A 90 03 3A
C0D8: 4C E7 C0 C9 05 90 03 4C 7C
C0E0: F1 C0 C9 00 B0 01 60 AD 1D
C0E8: E1 C2 C9 1B D0 F8 4C FF 88
C0F0: C0 AD E1 C2 C9 0B D0 03 AC
C0F8: 4C FF C0 C9 2A D0 E7 A9 5C
C100: E3 8D F8 07 EE E2 C2 20 26
C108: 42 C3 60 AD E1 C2 C9 00 8A
C110: D0 01 60 A0 00 AD E2 C2 36
C118: D9 E3 C2 F0 06 C8 C0 09 22
C120: D0 F3 60 A9 E0 8D F8 07 5D
C128: CE E1 C2 20 42 C3 60 AD CF
C130: E1 C2 C9 34 D0 01 60 A0 A5
C138: 00 AD E2 C2 D9 E3 C2 F0 FC
C140: 06 C8 C0 09 D0 F3 60 A9 A7
C148: E1 8D F8 07 EE E1 C2 20 6B
C150: 42 C3 60 AD DE 06 8D 79 50
C158: CB AD 79 CB C9 1F B0 04 B4
C160: 20 50 CB 60 AD 8B C9 C9 C9
C168: 08 F0 03 20 BF CA 60 AD 1D
C170: 03 C0 C9 7E D0 03 4C 98 35
C178: C1 C9 7D D0 03 4C 03 C2 67
C180: C9 7B D0 03 4C 6B C2 C9 DD
C188: 77 D0 03 4C 95 C2 C9 6F B1
C190: D0 03 4C BF C2 4C 13 C0 53
C198: AD E0 C2 C9 00 D0 03 4C D3
C1A0: 13 C0 C9 06 B0 03 4C DD 22
C1A8: C1 C9 0B B0 03 4C E7 C1 E8
C1B0: C9 10 B0 03 4C DD C1 C9 F3
C1B8: 15 B0 03 4C E7 C1 C9 1A 5B
C1C0: B0 03 4C DD C1 C9 1F B0 F9
C1C8: 03 4C E7 C1 C9 24 B0 03 63
C1D0: 4C DD C1 C9 29 B0 03 4C AF
C1D8: E7 C1 4C 13 C0 AD DF C2 F2
C1E0: C9 1B D0 F6 4C F5 C1 AD 3F
C1E8: DF C2 C9 0B D0 03 4C F5 76
C1F0: C1 C9 2A D0 E5 A9 E2 8D 77
C1F8: F9 07 CE E0 C2 20 EC C2 3C
C200: 4C 13 C0 AD E0 C2 C9 28 63
C208: D0 03 4C 13 C0 C9 23 90 79
C210: 03 4C 4F C2 C9 1E 90 03 EC
C218: 4C 45 C2 C9 19 90 03 4C 2F
C220: 4F C2 C9 14 90 03 4C 45 35
C228: C2 C9 0F 90 03 4C 4F C2 B5
C230: C9 0A 90 03 4C 45 C2 C9 B5
C238: 05 90 03 4C 4F C2 C9 00 F8
C240: B0 03 4C 13 C0 AD DF C2 64
C248: C9 1B D0 F6 4C 5D C2 AD 0F
C250: DF C2 C9 0B D0 03 4C 5D 45
C258: C2 C9 2A D0 E5 A9 E3 8D E0
C260: F9 07 EE E0 C2 20 EC C2 C3
C268: 4C 13 C0 AD DF C2 C9 00 A2
C270: D0 03 4C 13 C0 A0 00 AD B2
C278: E0 C2 D9 E3 C2 F0 08 C8 5E
C280: C0 09 D0 F3 4C 13 C0 A9 D8
C288: E0 8D F9 07 CE DF C2 20 89
C290: EC C2 4C 13 C0 AD DF C2 B0
C298: C9 34 D0 03 4C 13 C0 A0 2B
C2A0: 00 AD E0 C2 D9 E3 C2 F0 63
C2A8: 08 C8 C0 09 D0 F3 4C 13 67
C2B0: C0 A9 E1 8D F9 07 EE DF 5A
C2B8: C2 20 EC C2 4C 13 C0 AD 19
C2C0: FE 04 8D 78 CB AD 78 CB 87
C2C8: C9 1F B0 06 20 3C CB 4C DC
C2D0: 13 C0 AD 8A C9 C9 08 F0 69
C2D8: 03 20 42 CA 4C 13 C0 00 29
C2E0: 00 00 00 00 05 0A 0F 14 13
C2E8: 19 1E 23 28 AD DF C2 18 D3
C2F0: 69 00 85 FB A9 80 69 00 6F
C2F8: 85 FC AE E0 C2 E0 00 F0 9F
C300: 10 A5 FB 18 69 47 85 FB FB
C308: A5 FC 69 00 85 FC CA D0 32
C310: F0 A9 56 85 02 A9 04 85 BB
C318: 03 A2 08 A0 10 B1 FB 91 B5
C320: 02 88 10 F9 A5 02 18 69 DD
C328: 28 85 02 A5 03 69 00 85 6F
C330: 03 A5 FB 18 69 47 85 FB 1F
C338: A5 FC 69 00 85 FC CA 10 A1
C340: DA 60 AD E1 C2 18 69 00 4F
C348: 85 FB A9 80 69 00 85 FC DF
C350: AE E2 C2 E0 00 F0 10 A5 2C
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C358: FB 18 69 47 85 FB A5 FC 41
C360: 69 00 85 FC CA D0 F0 A9 82
C368: 36 85 FD A9 06 85 FE A2 F8
C370: 08 A0 10 B1 FB 91 FD 88 EE
C378: 10 F9 A5 FD 18 69 28 85 55
C380: FD A5 FE 69 00 85 FE A5 B6
C388: FB 18 69 47 85 FB A5 FC 71
C390: 69 00 85 FC CA 10 DA 60 92
C398: 00 00 00 4C 31 EA EE 99 89
C3A0: C3 AD 99 C3 C9 06 D0 F3 04
C3A8: A9 00 8D 99 C3 AD 9A C3 49
C3B0: F0 34 A9 00 8D 9A C3 AE 1A
C3B8: 98 C3 BD 33 C4 8D 00 D4 2D
C3C0: 8D 0E D4 BD AB C4 8D 01 ED
C3C8: D4 8D 0F D4 BD 23 C5 8D 43
C3D0: 07 D4 BD 9B C5 8D 08 D4 36
C3D8: A9 21 8D 04 D4 8D 0B D4 77
C3E0: 8D 12 D4 4C 9B C3 A9 40 EA
C3E8: 8D 04 D4 A9 20 8D 0B D4 86
C3F0: A9 10 8D 12 D4 EE 98 C3 6A
C3F8: AD 98 C3 C9 78 D0 05 A9 C4
C400: 00 8D 98 C3 A9 01 8D 9A BC
C408: C3 4C 9B C3 A2 00 BD 1A F1
C410: C4 9D 00 D4 E8 E0 19 D0 FA
C418: F5 60 00 00 00 06 00 18 8C
C420: 0B 00 00 00 00 00 08 09 3C
C428: 00 00 00 00 00 07 58 00 87
C430: 00 00 0F C3 C3 C3 C3 C3 12
C438: EF C3 C3 C3 C3 C3 C3 C3 82
C440: EF EF 1F C3 00 00 00 8F 92
C448: EF 1F C3 00 00 8F EF 1F B9
C450: C3 00 00 8F EF 1F C3 8F 06
C458: 8F EF EF 1F 1F C3 C3 8F 1D
C460: EF 1F C3 8F EF 1F C3 8F 25
C468: EF 1F C3 8F EF 1F C3 8F 2D
C470: EF 1F C3 8F 00 EF 00 1F E1
C478: 00 C3 00 8F 00 EF 00 1F DA
C480: 00 C3 00 8F EF 1F C3 00 A6
C488: 00 00 00 8F EF 1F C3 00 EA
C490: 00 00 00 1F 1F C3 C3 8F E5
C498: 8F EF EF C3 C3 8F EF 8F 9E
C4A0: EF 1F C3 C3 C3 8F EF 8F 0A
C4A8: EF 1F C3 10 10 10 10 10 CB
C4B0: 13 10 10 10 10 10 10 10 34
C4B8: 13 13 15 10 00 00 00 0C 10
C4C0: 13 15 10 00 00 0C 13 15 2D
C4C8: 10 00 00 0C 13 15 10 0C 29
C4D0: 0C 13 13 15 15 10 10 0C 59
C4D8: 13 15 10 0C 13 15 10 0C 61
C4E0: 13 15 10 0C 13 15 10 0C 69
C4E8: 13 15 10 0C 00 13 00 15 55
C4F0: 00 10 00 0C 00 13 00 15 35
C4F8: 00 10 00 0C 13 15 10 00 4D
C500: 00 00 00 0C 13 15 10 00 44
C508: 00 00 00 15 15 10 10 0C 5E
C510: 0C 13 13 10 10 0C 13 0C 8D
C518: 13 15 10 10 10 0C 13 0C 9B
C520: 13 15 10 47 F7 8F 61 47 CF
C528: F7 8F 61 47 F7 8F 61 47 88
C530: F7 8F 61 47 F7 8F 61 47 90
C538: F7 8F 61 47 F7 8F 61 47 98
C540: F7 8F 61 47 F7 8F 61 47 A0
C548: F7 8F 61 47 F7 8F 61 47 A8
C550: F7 8F 61 47 F7 8F 61 47 B0
C558: F7 8F 61 47 F7 8F 61 47 B8
C560: F7 8F 61 47 F7 8F 61 47 C0
C568: F7 8F 61 47 F7 8F 61 47 C8
C570: F7 8F 61 47 F7 8F 61 47 D0
C578: F7 8F 61 47 F7 8F 61 47 D8
C580: F7 8F 61 47 F7 8F 61 47 E0
C588: F7 8F 61 47 F7 8F 61 47 E8
C590: F7 8F 61 47 F7 8F 61 47 F0
C598: F7 8F 61 06 09 0A 08 06 A8
C5A0: 09 0A 08 06 09 0A 08 06 E2
C5A8: 09 0A 08 06 09 0A 08 06 EA
C5B0: 09 0A 08 06 09 0A 08 06 F2
C5B8: 09 0A 08 06 09 0A 08 06 FA
C5C0: 09 0A 08 06 09 0A 08 06 03
C5C8: 09 0A 08 06 09 0A 08 06 0B
C5D0: 09 0A 08 06 09 0A 08 06 13
C5D8: 09 0A 08 06 09 0A 08 06 1B
C5E0: 09 0A 08 06 09 0A 08 06 23
C5E8: 09 0A 08 06 09 0A 08 06 2B
C5F0: 09 0A 08 06 09 0A 08 06 33
C5F8: 09 0A 08 06 09 0A 08 06 3B
C600: 09 0A 08 06 09 0A 08 06 42
C608: 09 0A 08 06 09 0A 08 06 4A
C610: 09 0A 08 1A 1A 1A 1A 1A AD
C618: 1A 1A 15 A9 A9 A9 69 69 31
C620: 69 69 55 00 40 90 90 A4 4E
C628: A4 A9 A9 00 00 01 01 06 28
C630: 06 1A 1A AA 95 95 95 95 6B
C638: 95 95 AA AA 56 56 56 56 12
C640: 56 56 AA 59 65 96 59 65 AB
C648: 96 59 65 00 20 88 88 88 57
C650: 20 00 00 00 10 44 44 44 4D
C658: 10 00 00 00 30 CC CC CC FE
C660: 30 00 00 00 28 AA AA AA B8
C668: AA 28 00 00 14 55 55 55 4F
C670: 55 14 00 00 3C FF FF FF 16
C678: FF 3C 00 82 AA 82 82 AA 91
C680: 82 82 AA 41 55 41 41 55 9E
C688: 41 41 55 C3 FF C3 C3 FF AB
C690: C3 C3 FF FF FF FF FF FF 18
C698: FF FF FF 55 55 55 55 55 43
C6A0: 55 55 55 AA AA AA AA AA F5
C6A8: AA AA AA AD 0E DC 29 FE 69
C6B0: 8D 0E DC A5 01 29 FB 85 7A
C6B8: 01 A2 00 BD 00 D0 9D 00 88
C6C0: 30 BD 00 D1 9D 00 31 E8 38
C6C8: E0 00 D0 EF A5 01 09 04 1E
C6D0: 85 01 AD 0E DC 09 01 8D 87
C6D8: 0E DC A2 00 BD 13 C6 9D 9B
C6E0: D8 30 BD 8B C6 9D D0 31 99
C6E8: E8 E0 20 D0 EF A2 00 BD F3
C6F0: 33 C6 9D 18 31 E8 E0 58 F3
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C6F8: D0 F5 60 A2 00 BD 91 C7 D9
C700: 9D 00 D0 E8 E0 2E D0 F5 2D
C708: A2 00 BD BF C7 9D 00 38 C5
C710: E8 E0 00 D0 F5 A2 E0 8E B2
C718: F8 07 E8 8E F9 07 A9 00 3A
C720: 8D 03 C0 8D 04 C0 8D 98 E9
C728: C3 8D 99 C3 8D 9A C3 8D 50
C730: 8D C9 8D 80 CF 8D 81 CF 44
C738: 8D A5 CD 8D A6 CD 8D 3B 04
C740: CE 8D 64 CB 8D 65 CB 8D 19
C748: 4F CE 8D 8C C9 8D 8A C9 2C
C750: 8D 8B C9 8D 57 CA 8D D4 45
C758: CA A9 1C 8D E1 C2 A9 14 D8
C760: 8D E2 C2 8D E0 C2 A9 20 8E
C768: 8D 78 CB 8D 79 CB 8D DF 7A
C770: C2 A2 00 8A 9D 7E C9 9D E3
C778: 84 C9 E8 E0 06 D0 F5 A9 07
C780: FF 8D 4E CE A2 00 A9 3F B6
C788: 9D 64 CD E8 E0 3F D0 F8 2B
C790: 60 7F BC 7F 5C 00 00 00 09
C798: 00 00 00 00 00 00 00 00 98
C7A0: 00 00 1B 00 00 00 03 D8 97
C7A8: 00 1C 70 00 00 03 00 00 38
C7B0: 00 0B 00 02 01 00 07 0A CF
C7B8: 04 0E 00 00 00 00 00 00 CA
C7C0: 00 00 00 00 00 00 00 00 C0
C7C8: 00 28 00 00 18 00 00 18 21
C7D0: 00 00 08 00 00 08 00 00 E0
C7D8: 2A 00 00 2A 80 00 1A 30 F7
C7E0: 00 AA 00 00 82 80 00 80 0F
C7E8: 80 02 80 A0 05 55 54 03 3E
C7F0: 00 30 00 00 00 00 00 00 21
C7F8: 00 00 00 00 00 00 00 00 F8
C800: 00 00 00 00 00 00 00 00 00
C808: 00 02 80 00 02 40 00 02 CE
C810: 40 00 02 00 00 02 00 00 54
C818: 0A 80 00 2A 80 00 CA 40 58
C820: 00 2A A0 00 A0 20 00 80 2C
C828: 20 02 80 28 05 55 54 03 A4
C830: 00 30 00 00 00 00 00 00 60
C838: 00 00 00 00 00 00 00 00 38
C840: 00 00 00 00 00 00 00 00 40
C848: 00 08 00 00 2A 00 00 2A A4
C850: 00 00 08 00 00 2A 00 00 82
C858: AA 80 02 2A 80 01 2A 40 9B
C860: 00 2A 00 00 22 00 00 2E DA
C868: 00 00 2E 00 00 15 00 00 AB
C870: 15 00 00 04 00 00 00 00 89
C878: 00 00 00 00 00 00 00 00 78
C880: 00 00 00 00 00 00 00 00 80
C888: 00 08 00 00 26 00 00 26 DC
C890: 00 00 08 00 00 2A 00 00 C2
C898: AA 80 00 AA 30 00 6A 00 09
C8A0: 00 2A 00 00 22 00 00 2E 1B
C8A8: 00 00 2E 00 00 15 00 00 EB
C8B0: 15 00 00 04 00 00 00 00 C9
C8B8: 00 00 00 00 00 00 00 A9 62
C8C0: 99 20 D2 FF A9 93 20 D2 7D
C8C8: FF A2 00 A9 3B 9D 2D 04 1F
C8D0: 9D BD 05 9D 0D 06 9D 9D 1D
C8D8: 07 E8 E0 13 D0 EF A2 00 20
C8E0: A9 3B 9D 55 04 9D 67 04 C5
C8E8: 9D 35 06 9D 47 06 9D F5 40
C8F0: 04 9D 07 05 9D FD 06 9D DD
C8F8: 0F 07 18 8A 69 28 AA E0 CE
C900: C8 D0 DD A2 00 BD 92 CB 36
C908: 9D 43 04 9D 23 06 BD 98 0A
C910: CB 9D 6E 04 9D 4E 06 A9 87
C918: 03 9D 43 D8 9D 6E D8 A9 63
C920: 07 9D 23 DA 9D 4E DA E8 72
C928: E0 06 D0 D9 A2 00 BD 9E B8
C930: CB 9D 4A 04 BD A1 CB 9D B0
C938: 2A 06 A9 03 9D 4A D8 A9 7F
C940: 07 9D 2A DA E8 E0 03 D0 87
C948: E5 A2 00 BD 7A CB 8D 6E D0
C950: C9 BD 86 CB 8D 71 C9 18 0B
C958: BD 80 CB 69 D4 8D 6F C9 67
C960: 18 BD 8C CB 69 D4 8D 72 CC
C968: C9 A0 00 A9 01 99 BB D8 AB
C970: 99 9B DA C8 C0 0C D0 F5 DC
C978: E8 E0 06 D0 CE 60 00 00 48
C980: 00 00 00 00 00 00 00 00 80
C988: 00 00 00 00 00 00 A2 00 2B
C990: AD 1B D4 C9 0D B0 F9 8D 3D
C998: 8C C9 9D 7E C9 A0 00 AD 23
C9A0: 8C C9 F0 0B 18 98 69 0C 19
C9A8: A8 CE 8C C9 4C 9F C9 AE DA
C9B0: 8A C9 BD 7A CB 8D C4 C9 25
C9B8: BD 80 CB 8D C5 C9 A2 00 82
C9C0: B9 B1 CB 9D BB 04 C8 E8 07
C9C8: E0 0C D0 F4 18 A5 A2 69 45
C9D0: 0C C5 A2 D0 FC EE 8A C9 56
C9D8: AE 8A C9 AD 8A C9 C9 06 AD
C9E0: D0 AE A9 00 8D 8A C9 60 4C
C9E8: A2 00 AD 1B D4 C9 0D B0 B0
C9F0: F9 8D 8C C9 9D 84 C9 A0 5B
C9F8: 00 AD 8C C9 F0 0B 18 98 A9
CA00: 69 0C A8 CE 8C C9 4C F9 89
CA08: C9 AE 8B C9 BD 86 CB 8D 73
CA10: 1E CA BD 8C CB 8D 1F CA 86
CA18: A2 00 B9 B1 CB 9D 9B 06 31
CA20: C8 E8 E0 0C D0 F4 18 A5 42
CA28: A2 69 0E C5 A2 D0 FC EE 67
CA30: 8B C9 AE 8B C9 AD 8B C9 8C
CA38: C9 06 D0 AE A9 00 8D 8B 4A
CA40: C9 60 A0 00 B9 A4 CB CD 03
CA48: 78 CB F0 0C C8 C0 0D D0 F0
CA50: F3 A9 00 8D 78 CB 60 00 20
CA58: 8C 57 CA A0 00 B9 7E C9 A9
CA60: CD 57 CA F0 08 C8 C0 06 D8
CA68: D0 F3 4C 51 CA B9 7A CB 95
CA70: 8D B5 CA B9 80 CB 8D B6 C8
CA78: CA A9 63 99 7E C9 EE 8A AB
CA80: C9 A0 00 AD E0 C2 D9 E3 F9
CA88: C2 F0 05 C8 C0 09 D0 F3 98
CA90: B9 6F CB 8D A9 CA 18 B9 59
```

```
CA98: 66 CB 6D DF C2 8D A8 CA DB
CAA0: 90 03 EE A9 CA A9 20 8D EE
CAA8: 00 80 20 EC C2 20 42 C3 1F
CAB0: A0 00 A9 20 99 9B 06 C8 1F
CAB8: C0 0E D0 F6 4C 51 CA A0 58
CAC0: 00 B9 A4 CB CD 79 CB F0 EE
CAC8: 0C C8 C0 0D D0 F3 A9 00 D9
CAD0: 8D 79 CB 60 00 8C D4 CA 30
CAD8: A0 00 B9 84 C9 CD D4 CA EE
CAE0: F0 08 C8 C0 06 D0 F3 4C 7A
CAE8: CE CA B9 86 CB 8D 32 CB 1A
CAF0: B9 8C CB 8D 33 CB A9 63 9C
CAF8: 99 84 C9 EE 8B C9 A0 00 C5
CB00: AD E2 C2 D9 E3 C2 F0 05 C9
CB08: C8 C0 09 D0 F3 B9 6F CB 54
CB10: 8D 26 CB 18 B9 66 CB 6D 01
CB18: E1 C2 8D 25 CB 90 03 EE BD
CB20: 26 CB A9 20 8D 00 80 20 0A
CB28: 42 C3 20 EC C2 A0 00 A9 48
CB30: 20 99 9B 06 C8 C0 0C D0 F1
CB38: F6 4C CE CA A0 00 B9 7E ED
CB40: C9 C9 63 D0 0A C8 C0 06 A1
CB48: D0 F4 A9 01 8D 64 CB 60 D6
CB50: A0 00 B9 84 C9 C9 63 D0 F6
CB58: 0A C8 C0 06 D0 F4 A9 01 62
CB60: 8D 65 CB 60 00 00 24 87 2B
CB68: EA 4D B0 13 76 D9 3C 81 72
CB70: 82 83 85 86 88 89 8A 8C AB
CB78: 20 20 BB E3 0B 33 5B 83 75
CB80: 04 04 05 05 05 05 9B C3 FB
CB88: EB 13 3B 63 06 06 06 07 3F
CB90: 07 07 10 0C 01 19 05 12 EB
CB98: 09 14 05 0D 13 20 0F 0E 18
CBA0: 05 14 17 0F 26 27 28 29 7E
CBA8: 2A 2B 2C 2D 3A 3B 3C 3D 46
CBB0: 25 17 08 09 14 05 20 12 49
CBB8: 09 0E 07 20 20 12 05 04 32
CBC0: 20 20 20 12 09 0E 07 20 71
CBC8: 20 07 12 05 05 0E 20 12 4C
CBD0: 09 0E 07 20 20 17 08 09 57
CBD8: 14 05 20 02 01 0C 0C 20 4D
CBE0: 20 12 05 04 20 20 20 02 7E
CBE8: 01 0C 0C 20 20 07 12 05 60
CBF0: 05 0E 20 02 01 0C 0C 20 5F
CBF8: 20 17 08 09 14 05 20 0C 86
CC00: 01 04 04 05 12 12 05 04 3B
CC08: 20 20 20 0C 01 04 04 05 82
CC10: 12 07 12 05 05 0E 20 0C 7F
CC18: 01 04 04 05 12 07 12 05 56
CC20: 05 0E 20 02 0F 18 20 20 BC
CC28: 20 12 05 04 20 20 20 02 C5
CC30: 0F 18 20 20 20 17 08 09 DF
CC38: 14 05 20 02 0F 18 20 20 DA
CC40: 20 02 01 12 02 05 12 20 AE
CC48: 10 0F 0C 05 20 A2 00 A9 E4
CC50: 23 9D 00 80 A9 24 9D 01 FD
CC58: 80 E8 E8 E0 00 D0 F0 EE 3C
CC60: 58 CC EE 53 CC AD 53 CC 62
CC68: C9 8F D0 E1 A9 80 8D 53 7F
CC70: CC 8D 58 CC A2 00 A9 20 5C
CC78: 9D DC 80 9D 23 81 9D 6A BD
CC80: 81 9D 3F 82 9D 86 82 9D A5
CC88: CD 82 9D A2 83 9D E9 83 A7
CC90: 9D 30 84 9D 05 85 9D 4C F4
CC98: 85 9D 93 85 9D 68 86 9D FE
CCA0: AF 86 9D F6 86 9D CB 87 E2
CCA8: 9D 12 88 9D 59 88 9D 2E 2C
CCB0: 89 9D 75 89 9D BC 89 9D 58
CCB8: 91 8A 9D D8 8A 9D 1F 8B 1E
CCC0: 9D F4 8B 9D 3B 8C 9D 82 64
CCC8: 8C E8 E0 37 D0 A8 A9 00 79
CCD0: 8D 8D C9 AE 8D C9 BD 0D 86
CCD8: CD 8D 0A CD BD 19 CD 8D 3E
CCE0: 0B CD A2 00 A9 20 20 09 4F
CCE8: CD E8 20 09 CD E8 20 09 A8
CCF0: CD A2 47 20 09 CD E8 20 A8
CCF8: 09 CD E8 20 09 CD EE 8D 2C
CD00: C9 AD 8D C9 C9 0C D0 CB 41
CD08: 60 9D 00 30 60 CC 1F 3E C0
CD10: 92 E5 04 58 AB CA 1E 71 EA
CD18: 90 81 83 83 84 85 86 87 49
CD20: 88 88 8A 8B 8B 26 27 28 48
CD28: 29 2A 2B 2C 2D 3A 3B 3C B1
CD30: 3D 25 26 27 28 29 2A 2B 86
CD38: 2C 2D 3A 3B 3C 3D 25 26 CB
CD40: 27 28 29 2A 2B 2C 2D 3A A1
CD48: 3B 3C 3D 25 26 27 28 29 C0
CD50: 2A 2B 2C 2D 3A 3B 3C 3D ED
CD58: 25 26 27 28 29 2A 2B 2C 9D
CD60: 2D 3A 3B 3C 00 00 00 00 3F
CD68: 00 00 00 00 00 00 00 00 68
CD70: 00 00 00 00 00 00 00 00 70
CD78: 00 00 00 00 00 00 00 00 78
CD80: 00 00 00 00 00 00 00 00 80
CD88: 00 00 00 00 00 00 00 00 88
CD90: 00 00 00 00 00 00 00 00 90
CD98: 00 00 00 00 00 00 00 00 98
CDA0: 00 00 00 00 00 00 00 20 C0
CDA8: 50 CE A0 00 AE A5 CD BD 48
CDB0: 3C CE 8D C5 CD BD 45 CE AE
CDB8: 8D C6 CD BE 64 CD BD 25 AE
CDC0: CD AE A6 CD 9D 25 81 C8 BE
CDC8: 18 AD A6 CD 69 08 8D A6 A8
CDD0: CD AD A6 CD C9 38 D0 E3 77
CDD8: A9 00 8D A6 CD EE A5 CD E6
CDE0: AD A5 CD C9 09 D0 C5 AE 1A
CDE8: 1B D4 18 A5 A2 69 0C C5 74
CDF0: A2 D0 FC E0 09 B0 F0 BD AA
CDF8: 3C CE 8D 38 CE BD 45 CE 6A
CE00: 8D 39 CE AD 1B D4 C9 28 25
CE08: B0 F9 8D 3B CE 18 AD 38 48
CE10: CE 6D 3B CE 8D 38 CE 90 7B
CE18: 03 EE 39 CE A2 00 A9 1E 7C
CE20: 20 37 CE E8 A9 1D 20 37 4D
CE28: CE A2 47 A9 1B 20 37 CE CB
CE30: E8 A9 1C 20 37 CE 60 9D 03
```

**IMPORTANT!** Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 83 and 84 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
CE38: 00 84 60 00 26 89 EC 4F 09
CE40: B2 15 78 DB 3E 81 82 83 22
CE48: 85 86 88 89 8A 8C FF 00 7D
CE50: AD 1B D4 8D 4F CE C9 3F A2
CE58: B0 F6 A2 00 AD 4F CE DD 4C
CE60: 64 CD F0 EC E8 E0 3E D0 49
CE68: F3 EE 4E CE AC 4E CE AD DF
CE70: 4F CE 99 64 CD AD 4E CE 25
CE78: C9 3E D0 D4 A9 00 8D A5 03
CE80: CD 8D A6 CD 60 20 73 CF 14
CE88: 20 0C C4 A2 00 BD D8 CE 81
CE90: 9D A6 04 A9 07 9D A6 D8 A6
CE98: E8 E0 11 D0 F0 4C B8 CE 09
CEA0: 20 73 CF 20 0C C4 A2 00 97
CEA8: BD E9 CE 9D 86 06 A9 07 F9
CEB0: 9D 86 DA E8 E0 11 D0 F0 4C
CEB8: A2 00 BD FA CE 9D E7 05 6D
CEC0: A9 01 9D E7 D9 E8 E0 10 A4
CEC8: D0 F0 20 E4 FF C9 00 F0 4A
CED0: F9 C9 85 D0 F5 4C 82 CF 7F
CED8: 10 0C 01 19 05 12 20 0F 55
CEE0: 0E 05 20 20 17 09 0E 13 75
CEE8: 21 10 0C 01 19 05 12 20 77
CEF0: 14 17 0F 20 20 17 09 0E 99
CEF8: 13 21 10 12 05 13 13 20 9A
CF00: 06 31 20 14 0F 20 10 0C B6
CF08: 01 19 20 13 03 01 16 05 74
CF10: 0E 07 05 12 20 20 08 15 99
CF18: 0E 14 20 20 02 19 20 02 B7
CF20: 0F 02 20 02 0C 01 03 0B 6E
CF28: 0D 05 12 20 13 08 0F 12 A8
CF30: 14 20 10 01 15 13 05 42 E4
CF38: 4C 41 43 4B 4D 45 52 20 59
CF40: AB C6 20 FB C6 20 BF C8 3E
CF48: A2 00 BD 0A CF 9D A6 04 CA
CF50: BD 1B CF 9D 46 05 A9 07 92
CF58: 9D A6 D8 9D 46 D9 E8 E0 FC
CF60: 11 D0 E7 4C B8 CE 78 A9 20
CF68: 9E 8D 14 03 A9 C3 8D 15 BB
CF70: 03 58 60 78 A9 31 8D 14 21
CF78: 03 A9 EA 8D 15 03 58 60 6E
CF80: 00 00 A9 80 8D 0E D4 8D A8
CF88: 12 D4 A9 8F 8D 18 D4 20 43
CF90: FB C6 20 BF C8 A2 00 BD 5C
CF98: 2C CF 9D 71 05 A9 01 9D F0
CFA0: 71 D9 E8 E0 0B D0 F0 20 A2
CFA8: 4D CC 20 A7 CD 20 BF C8 01
CFB0: 20 8E C9 20 E8 C9 20 42 5E
CFB8: C3 20 EC C2 20 0C C4 20 5D
CFC0: 66 CF EE 80 CF AD 80 CF 34
CFC8: C9 00 D0 F6 EE 81 CF AD 48
CFD0: 81 CF C9 09 D0 EC A9 00 5C
CFD8: 8D 81 CF 20 06 C0 AD 64 B0
CFE0: CB F0 03 4C 85 CE AD 65 54
CFE8: CB F0 03 4C A0 CE 4C C2 73
CFF0: CF 00 00 00 00 00 00 00 C0
```

# GRAPHIC WEDGE
## FROM PAGE 29

```
•0 DATA"A[3"0"]B197C169D251E133F208G160H0
32I253J192K165L144M201N2520008P141Q076R1
45"                                       OJ
•1 DATA"S173T002U024V096W177X007Y210Z162[
194[EP]200]254[UPARROW]255[BACKARROW]232
:001;056<176=233>230"                     AJ
•2 DATA"?003@009 181!198#207$006%095&172'
217(074)193*195+221-224.105/010[PI]"      IM
•3 DATA"C92,E;CQE115,CHE116,CJE117,VZA189
,)J240,XHY[UPARROW][BACKARROW]Q19,JVH234
,*H121,AM92,240,"                         OG
•4 DATA"?Q190,JH234,*H121,A140,161,B142,Z
BM85,F$H148,)Q JM68,F$H22,[Q JM82,F$"     KH
•5 DATA"H153,[Q JMQF$H239,JQ JM67,F$H *Q
JM72,F$HL*Q JM84,F?Q106,*M80,F11,C:P"     ED
•6 DATA"215,BH'JQ JM69,F11,CAP215,BH'JQ J
M83,F$H213,196,Q JM79,F$H50,BQ JM73,"     AP
•7 DATA"F?H17,J&161,B174,ZBQ115,AQ121,AFY
#199,Y)205,G['GY#[BY212,G[M216,['AH178,"  AB
•8 DATA"WK100,P164,BK101,P163,BH155,183,1
42,166,BQ241,*CAEDCVENGAC248,EIC%E]C"     IL
•9 DATA"A153,248,%WDU/RDL5,C:153,248,%[EP
]JOF=WDU/RDL$WI@:RI[EP]F239,>N>]KNM127,L
XK"                                       IP
•10 DATA"DM64,L:VWDU/RDL$WI@:RI[EP]J64,L2
37,KDU.;EDLT>NGA185,248,%17,DRD[EP]JOF24
4,"                                       FN
•11 DATA"GAKDU.OEDLT>NKNE]KD;=OEI<T!]KNM1
27,LXKDM64,L:VGAQ:)CVENE]CA170,EDCXE"     JH
•12 DATA"IGAWD157,175,B[EP]WD136,RD[EP][E
P]JOF245,KDU.OEDLT>N[BACKARROW]-40,L+GAW
DRI[EP]WD136,RD[EP][EP]J"                 GD
•13 DATA"OF245,KDU.OEDLT>NKIU.OEILT>]KNM1
28,FYZAC126,E]CXEIGA189,175,BRIKIU.O"     EK
•14 DATA"EILT>][BACKARROW]-40,L235,VC127,
ENC;EDC127,E]C49,EIZAGXWD157,175,B136,WD
[EP]RD136,"                               JL
•15 DATA"JAF245,KD;=OED<T!N[BACKARROW]-40
,L[3"2"],GXWDRI136,WD[EP]RD136,JAF245,KD
;=OED<T!NKI;"                             OO
•16 DATA"=OEI<T!]KNM%F211,C;EDC97,ENGAZA1
89,175,BRDKD;=OED<T!N[BACKARROW]-40,L235
,VC127,"                                  IP
•17 DATA"ENC;EDC%E]C247,EIGAZAWDU(RDCARIL
4,C128,RI[EP]JOF235,KNE]KD;=OEI<T!]GAWI"  AM
•18 DATA"U(RIL@WDU.128,<TRD[EP]JOF234,K]E
NKIEDKI;=OEI<@!]K]M%F:V[BACKARROW]-38,FM
ZAGAWIU(R"                                GK
•19 DATA"IL@C128,U113,D<TRDWIU121,247,%<T
RI[EP]JOF-KI;=OEI<T!]KIEDK]ENKNM%F:VC%E"  KH
•20 DATA"]C247,EIGAQS[FY#199,Y)205,G['GY#
```

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```
 [BY212,G[M216,['ST+@?PT+SA+41,N@?PA+"      GM
•21 DATA"C21,PUFC27,P17,FCAE!CAP21,FVST+@
 ?PT+SA+41,N@TPA+SUF41,15,@120,PUFS17,"     EH
•22 DATA"F@HP17,FVC92,ENCAEDGAZAC:RD[EP]J
 AF249,>N[BACKARROW]-4,L242,CVENGAZACARD[
 EP]JAF249,[BACKARROW]>"                    BG
•23 DATA"N-HL242,V>122,FT>123,VS164,B(S16
 3,B106,((PKBS166,B[3"("]P167,BS166,B41,"   HF
•24 DATA"XP168,B174,167,BCAPCBP170,B-A240
 ,21,SCBU.64,PCBL?238,170,B238,170,B202,"   ED
•25 DATA"Q26,196,142,171,B142,&BSKBU[3"/"
 ]L?238,&BU109,168,BP171,BL?238,&BSCBU109
 ,"                                         BE
•26 DATA"171,BP171,BL?238,&BS170,BU109,&B
 P&BCVU109,&BP&BS163,B41,XPSBCX;237,S"      FG
•27 DATA"BPSBC:ZA236,SB240,5,/[BACKARROW]
 Q136,196,P174,BS&BE34,S171,BE33,GAS215,B
 240,31,"                                   AL
•28 DATA"W33,13,174,BR33,VFY#199,Y)205,G[
 'GY#[BY212,G[M216,['S174,B73,[UPARROW]P1
 74,B"                                      ID
•29 DATA"W33,45,174,BR33,VH106,*Q228,196,
 147,14,0211,)214,BGAZA134,!189,219,196,"   HG
•30 DATA"240,XHY[UPARROW][BACKARROW]Q[BAC
 KARROW]196,GAH#[UPARROW]153,=X[EP]J16,<4
 ,M13,F241,JT<:V140,[BACKARROW]XCOZOG[UPA
 RROW]H186,[UPARROW]S[BACKARROW]"           HN
•31 DATA"XZ=GXH189,[UPARROW]CAE34,C92,E35
 ,C34,ZAG128,H216,[UPARROW]VH106,*Q65,B14
 7,14,0204,#)"                              IN
•32 DATA"196,GAZA134,!189,;B240,XHY[UPARR
 OW][BACKARROW]Q69,BGAH#[UPARROW]153,=X[E
 P]J16,<4,M13,F241,JT<:V140,"               FD
•33 DATA"[BACKARROW]XCOZOG[UPARROW]H186,[
 UPARROW]S[BACKARROW]XZ=GXH189,[UPARROW]H
 L*CAZ[UPARROW]G[UPARROW]H213,[UPARROW]VF
 Y#199,Y)205,G['GY#[BY212,"                 JH
•34 DATA"G[M216,[':[UPARROW]100,A12,100,1
 2,4,A15,100,[3"1"],?O[26"A"]"              AI
•35 DATA"[14"A"]:M44,F16,H122,190,36,61,4
 8,28,K85,MOL22,PJT&)T185,61,@"             HA
•36 DATA"[PI]"                              OP
•200 DIMB(96):GOSUB201:END                  GO
•201 READD$:FORI=1TOLEN(D$)STEP4:DE$=MID$
 (D$,I,4):D1$=LEFT$(DE$,1)                  DA
•202 IFD1$="[PI]"THEN280                    CL
•203 D2$=RIGHT$(DE$,3):B(ASC(D1$))=VAL(D2
 $):NEXT:GOTO201                            AL
•280 N$="GWML":OPEN15,8,15,"S:"+N$:OPEN1,
 8,1,"0:"+N$+",P,W"                         ND
•290 PRINT#1,CHR$(000)CHR$(192);            KI
•300 READB$:FORA=1TOLEN(B$):A$=MID$(B$,A,
 1):IFA$=","THENB=VAL(C$):C$="":GOTO360     MG
•320 IFA$<":"ANDA$>"/"THENC$=C$+A$:NEXT     IO
•330 IFA$="[PI]"THEN370                     GO
•340 B=B(ASC(A$))                           DI
•360 C=C+B:PRINT#1,CHR$(B);:NEXT:GOTO300    BB
•370 IFC<> 215247 THENPRINT"CHECK FOR TYP
 ING ERROR":GOTO390                         KH
•380 PRINTN$" SAVED TO DISK"                GI
•390 CLOSE1:CLOSE15:RETURN                  FN
```

# STARTUP

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```
•10 IFPEEK(215)=0THEN90                     DJ
•15 X1=20:X2=59:X3=21:X4=58:X5=25:X6=53     HM
•20 FAST:WINDOW 0,0,79,24                   DL
•25 PRINT"[CLEAR][6"[DOWN]"]":PRINTTAB(20
 )"[c 7][s O][36"[c Y]"][s P][RVSON][BLUE
 ][c *]"                                    BG
•30 PRINTTAB(20)"[c 7][c G][36" "][c M][R
 VSON][BLUE] "                              NA
•35 PRINTTAB(20)"[c 7][c G][8" "][c 3]S [
 c 6]T [c 1]A [RED]R [c 8]T [YELLOW]U [CY
 AN]P[WHITE][4" "]128[c 7][8" "][c M][RVS
 ON][BLUE] "                                FM
•40 PRINTTAB(20)"[c 7][c G][36" "][c M][R
 VSON][BLUE] "                              PC
•45 PRINTTAB(20)"[c 7][s L][36"[c P]"][s
 @][RVSON][BLUE] "                          EH
•50 PRINTTAB(20)"[39"[c Y]"][3"[DOWN]"]"    EH
•55 PRINTTAB(28)"[6"[DOWN]"][RED]HIT 'SPA
 CE' TO START[6"[UP]"]"                     OB
•60 NAM$="[GREEN]DESIGNED BY MIKE DAVILA,
  MIKE KRESS PHD. AND PAUL MAIORIELLO [16
 "."] "                                     OL
•65 FORI=1TOLEN(NAM$):PRINTMID$(NAM$,I)LE
 FT$(NAM$,I)                                EE
•70 FORJ=1TO100:NEXT:NN$=MID$(NAM$,I,1)     EO
•75 GETS$:IFS$=CHR$(32)THEN315              NK
•80 PRINT"[UP]";:NEXT:GOTO60                NN
•85 END                                     NF
•90 FAST                                    IH
•95 X1=0:X2=39:X3=1:X4=38:X5=5:X6=33        DM
•100 GOSUB540:SLOW:Q=0:EC$="START"          LC
•105 COLOR1,2:COLOR0,13:COLOR4,13:PX=90:    KN
•110 GRAPHIC1,1                             NP
•115 BOX1,40,40,284,160                     CL
•120 BOX1,45,45,279,155                     DO
•125 BOX1,140,92,172,105                    KN
•130 DRAW1,70,80TO250,80:COLOR1,13          DK
•135 DIM B$(7):C$="STARTUP":FORI=1TO7:B$(
 I)=MID$(C$,I,1):NEXT                       FK
•140 FORB=1TO7                              AN
•145 CHAR,2,2,B$(B)                         DP
•150 SSHAPEA$,11,10,34,31                   BA
•155 SPRSAVA$,B                             HC
•160 MOVSPRB,375,100                        GF
•165 SPRITEB,1,B,0,1,1,0                    BG
•170 : DO UNTIL PX=Q                        HF
•175 :    MOVSPR B,Q,96                     DJ
```

```
•180 :   Q=Q+2                                BI
•185 : LOOP                                   NL
•190 PX=PX+24                                 NH
•195 NEXT B                                   IP
•200 COLOR1,4:CHAR1,18,12,"128":COLOR1,7      CG
•205 MD$="DESIGNED BY MIKE DAVILA,"           MB
•210 MK$="MIKE KRESS PHD. AND"                JF
•215 PM$="PAUL MAIORIELLO."                   BP
•220 BEG$="==> HIT SPACE TO START"            EE
•225 CHAR1,9,14,MD$:CHAR1,11,15,MK$           IH
•230 CHAR1,13,16,PM$                          OI
•235 COLOR1,2:CHAR1,9,18,BEG$                 MO
•240 MOVSPR 8,125,250:SPRITE8,1,1             EJ
•245 MOVSPR 8,360#3:SYS51598                  DH
•250 : PX2=137                                HC
•255 : DO UNTIL PX2=S8                        DF
•260 :   S8=RSPPOS(8,1)                       EC
•265 : LOOP                                   DE
•270 MOVSPR8,90#3:SLEEP1:MOVSPR8,90#0         NA
•275 GETK$                                    CB
•280 FORX=1TO7                                KI
•285 SPRITEX,,INT(RND(0)*15+1)                CA
•290 NEXTX                                    PJ
•295 IFK$<>CHR$(32)THEN275                    FK
•300 FORX=1TO8:SPRITEX,0:NEXT                 GM
•305 FAST:GRAPHIC CLR:PRINT CHR$(142):SLO
 W                                            OM
•310 GRAPHIC0,1:COLOR0,1:COLOR4,1:COLOR5,
 7                                            MC
•315 SCNCLR                                   CE
•320 WINDOW X1,0,X2,24,1:PRINTTAB(10)"[DO
 WN][DOWN][c 3]S [c 6]T [c 1]A [RED]R [c
 8]T [YELLOW]U [CYAN]P[WHITE][4" "]128[DO
 WN][GREEN]"                                  CP
•325 PRINT"[12" "][c 7] ENTER SELECTION[G
 REEN]"                                       OF
•330 PRINT"[s U][18"[s *]"][c R][19"[s *]
 "][s I]"                                     BN
•335 PRINT"[s B][18" "][s -][19" "][s -]"     MK
•340 PRINT"[s B]A> BOOT THE DISK  [s -] H
 > SAVE STARTUP[3" "][s -]"                   CI
•345 PRINT"[s B]B> GO 64[10" "][s -] I> M
 AKE AUTOBOOT  [s -]"                         FM
•350 PRINT"[s B]C> COLLECT DISK[3" "][s -
 ] J> PROTECT BOOT[3" "][s -]"                IE
•355 PRINT"[s B]D> DIRECTORY[6" "][s -] K
 > COPY A FILE[4" "][s -]"                    NG
•360 PRINT"[s B]E> SCRATCH A FILE [s -] L
 > STASH STARTUP  [s -]"                      CN
•365 PRINT"[s B]F> FORMAT DISK[4" "][s -]
  M> QUIT STARTUP[3" "][s -]"                 NB
•370 PRINT"[s B]G> RENAME A FILE  [s -][1
 9" "][s -]"                                  BH
•375 PRINT"[s B][18" "][s -][19" "][s -]"     PC
•380 PRINT"[c Q][18"[s *]"][c E][19"[s *]
 "][c W]"                                     FK
•385 PRINT"[s B][38" "][s -]"                 ED
•390 PRINT"[s B][38" "][s -]"                 DK
•395 PRINT"[s B][38" "][s -]"                 EF
•400 PRINT"[s J][38"[s *]"][s K]":SYS5159
 8                                            CP
•405 WINDOW X3,16,X4,18,1                     IJ
•410 IFEC$="START"THEN 455                    OE
•415 IFLEFT$(EC$,1)<>"E"THENPRINTTAB(6)"[
 RVSON][c 7]LAST OPERATION SUCCESSFUL[GRE
 EN]":ELSE BEGIN                              HO
•420 :PRINTTAB(4)"[RVSON][RED]LAST OPERAT
 ION UNSUCCESSFUL[GREEN]"                     LI
•425 :IFEC$="E1"THENPRINTTAB(3)"FILE TO B
 E SCRATCHED NOT FOUND";:GOTO 450             BP
•430 :IFEC$="E3"THENPRINTTAB(3)"COLLECT F
 AILED TRY AGAIN";:GOTO 450                   HJ
•435 :IFEC$="E5"THENPRINTTAB(3)"THIS IS N
 OT AN AUTOBOOT DISK":GOTO 450                FA
•440 :IFDS=0THENPRINTTAB(4)DK$:GOTO450        NL
•445 :PRINTTAB(4)DS$                          GP
•450 BEND                                     NM
•455 WINDOWX1,0,X2,24                         PO
•460 EC$="OK":DK=0:DK$=""                     JO
•465 GETKEYC$                                 MM
•470 IFC$="A"THEN640                          CO
•475 IFC$="B"THEN660                          DM
•480 IFC$="C"THEN675                          EA
•485 IFC$="D"THEN755                          GL
•490 IFC$="E"THEN785                          EG
•495 IFC$="F"THEN885                          EL
•500 IFC$="G"THEN1085                         HG
•505 IFC$="H"THEN1180                         JE
•510 IFC$="I"THEN1205                         JI
•515 IFC$="J"THEN1305                         JI
•520 IFC$="K"THEN1370                         KG
•525 IFC$="L"THEN1460                         KA
•530 IFC$="M"THEN600                          HJ
•535 GOTO 465                                 EA
•540 FOR T=4031TO4096:READD$:POKET,DEC(D$
 ):NEXT                                       IJ
•545 RESTORE 600                              EG
•550 FOR X=3072TO3205:READML$:POKEX,DEC(M
 L$):NEXT                                     DN
•555 RETURN                                   LL
•560 DATA 5F,FF,FF,FF,FF,FF,FF,FF,FF,FF       NE
•565 DATA FF,FF,FF,3F,FF,FF,3F,FF,FF,FF       OO
•570 DATA FF,FF,FF,FF,FF,FF,83,FF,FF,1        OF
•575 DATA FF,FF,1,FF,FF,1,FF,FF,1,FF          KI
•580 DATA FF,83,9F,FF,FF,9F,FF,EF,FF,FF       JP
•585 DATA C7,FF,FF,C7,FF,FF,C7,FF,FF,EF       LH
•590 DATA FF,FF,FF,FF,81,7,6,A,7,6            HF
•595 DATA 4,5                                 GE
•600 DATA A9,F,8D,0,FF,AD,10,12,AE,11,12,
 85,2F,86,30,85,31,86,32,85,33,86,34,A9,2
 D,8D,B9                                      JD
•605 DATA 2,A0,0,B1,2D,A2,1,20,77,FF,C8,C
 C,10,12,F0,7,C0,0,F0,13,4C,1E,C,A5,2E,CD
 ,11                                          DO
•610 DATA 12,D0,E5,A9,1,85,2D,A9,1C,85,2E
 ,60,E6,2E,4C,1E,C,EA,EA,EA,EA                JO
```

```
•615 DATA A9,0,8D,0,FF,A0,0,A2,1,A9          AF
•620 DATA 2D,20,74,FF,91,2D,C8,C4,2F         AL
•625 DATA F0,7,C0,0,F0                       GA
•630 DATA 1C,4C,52,C,A5,30,C5,2E,D0,E5,A9
 ,1,85,2D,A9,1C,85,2E,A5,2F,A6,30,8D,10,1
 2,8E,11,12,60,E6,2E,4C,52,C,0               IH
•635 PRINT CHR$(147):END                     HG
•640 GOSUB 1520                              NH
•645 IF LEFT$(YN$,1)<>"Y" THEN 320           DI
•650 WINDOW X1,0,X2,24,1:BOOT                HF
•655 IFDS<>0 THEN EC$="E5":GOTO320           OL
•660 GOSUB 1520                              OL
•665 IF LEFT$(YN$,1)<>"Y" THEN 320           LE
•670 SYS65357                                DI
•675 WINDOW X3,16,X4,18,1                    JO
•680 PRINT "INSERT DISK TO BE COLLECTED"     GI
•685 GOSUB 1595                              AK
•690 GOSUB745:PRINT#15,"B-P";8;0:GET#8,Q$
 :U=ASC(Q$):IF U <> 67 THEN PRINT"NOT AUT
 OBOOT, NORMAL COLLECT":GOTO715              KA
•695 PRINT "AUTOBOOT DISK - DISABLE THEN
 COLLECT":SLEEP 2                            DC
•700 X=0:V=0:GOSUB750:PRINT#15,"U2:8 0 1
 0":DCLOSE:DK$=DS$:DK=DS:IF DK=0 THEN 725 JM
•705 EC$="E0"                                OD
•710 DCLOSE:GOTO320                          CM
•715 COLLECT:PRINT "CLEANING UP DISK[3"."
 ]":IF DS THEN EC$="E3"                      HL
•720 GOTO 710                                PA
•725 COLLECT:PRINT "CLEANING UP DISK[3"."
 ]":IF DS THEN EC$="E3":GOTO 320             NN
•730 GOSUB745:PRINT#15,"B-P";8;0:GET#8,Q$
 :U=ASC(Q$):IF U <> 0 THEN PRINT"SEQUENCE
  ERROR - REDO COLLECT":SLEEP4:GOTO710       CA
•735 PRINT "AUTOBOOT DISK - REENABLING AU
 TOBOOT":SLEEP 3                             ON
•740 X=0:V=67:GOSUB750:PRINT#15,"U2:8 0 1
 0":DK$=DS$:DK=DS:IF DK=0 THEN 710 ELSE
 705                                         DC
•745 OPEN15,8,15,"IJ":DK$=DS$:DK=DS:IFDST
 HEN EC$="E0":GOTO710:ELSEOPEN8,8,8,"#":P
 RINT#15,"U1:8 0 1 0":RETURN                 HF
•750 PRINT#15,"B-P";8;X:PRINT#8,CHR$(V);:
 RETURN                                      JD
•755 SCNCLR:WINDOW1,1,39,24,1                DD
•760 DIRECTORY                               OI
•765 KS=DS:KS$=DS$:IF KS<>0 THEN EC$="E0"
 :GOTO 780                                   DM
•770 PRINTTAB(4)"[RVSON]PRESS ANY KEY TO
 CONTINUE"                                   HF
•775 GETKEY XX$                              HI
•780 GOTO315                                 CO
•785 SCNCLR:PRINT TAB(5)                     NE
•790 PRINT "ENTER NAME OF FILE TO SCRATCH
 "                                           GG
•795 PRINT TAB(3):PRINT "[RVSON]$ FOR DIR
 ECTORY -> RETURN TO EXIT"                   EL
•800 PRINT "?";                              GK
•805 CA$="":CF$=""                           KH
•810 GETKEY CH$:IF CH$=CHR$(20) THEN 810     IL
•815 IF CH$ = "$" THEN 870                   KB
•820 IF CH$=CHR$(13) THEN 865                KF
•825 CF$=CH$:PRINT CH$;                      BJ
•830 DO UNTIL CA$=CHR$(13)                   AJ
•835 :GETKEY CA$:PRINT CA$;                  HH
•840 :IF CA$=CHR$(20) AND LEN(CF$)>0 THEN
  CF$=LEFT$(CF$,LEN(CF$)-1):ELSE CF$=CF$+
 CA$                                         NN
•845 IF LEN(CF$)=0 THEN 805                  OG
•850 LOOP                                    EB
•855 SCRATCH ""+CF$:IF DS <> 1 THEN EC$="
 E"                                          EC
•860 IF(MID$(DS$,21,2)) ="00"THEN EC$="E1
 "                                           BA
•865 GOTO 315                                HN
•870 WINDOW X5,4,X6,24,1:DIRECTORY:DK$=DS
 $:DK=DS:IF DS<>0 THEN EC$="E0":GOTO 865     AC
•875 WINDOW X1,0,X2,24:PRINT:PRINT:PRINTS
 PC(1)                                       EC
•880 GOTO 805                                JI
•885 WINDOW X3,16,X4,18,1                    DL
•890 GOSUB 1070                              NG
•895 PRINT"[HOME]":PRINT CHR$(150):PRINTT
 AB(13)"[RVSON]FORMAT DISK":SLEEP1           KJ
•900 PRINT"[HOME][DOWN][RVSON]WARNING!!
 DISK WILL BE TOTALLY ERASED";               EE
•905 PRINT "DO YOU WISH TO CONTINUE (Y/N)
  ?";                                        ME
•910 GET YN$                                 PO
•915 IF YN$="" THEN PRINT "[HOME][DOWN]WA
 RNING!![HOME][DOWN][RVSON]WARNING!!":GOT
 0 910                                       CE
•920 IF YN$<>"Y" THEN EC$="START":PRINTCH
 R$(27)+"L":GOTO 310                         BE
•925 PRINTCHR$(27)+"L";                      CG
•930 SCNCLR:PRINT TAB(5)                     GJ
•935 PRINT "ENTER DISK NAME ->[RVSON]RETU
 RN[RVSOFF]TO ABORT"                         HN
•940 PRINT "?";                              AG
•945 CA$="":CF$=""                           DD
•950 GETKEY CH$:IF CH$=CHR$(20) THEN 950     LM
•955 IF CH$=CHR$(13) THEN EC$="START":GOT
 0 310                                       KH
•960 CF$=CH$:PRINT CH$;                      HA
•965 DO UNTIL CA$=CHR$(13)                   IG
•970 :GETKEY CA$:PRINT CA$;                  AA
•975 :IF CA$=CHR$(20) AND LEN (CF$)>0 THE
 N CF$=LEFT$(CF$,LEN(CF$)-1):ELSE CF$=CF$
 +CA$                                        DI
•980 IF LEN(CF$)=0 THEN 945                  EG
•985 LOOP                                    MI
•990 CF$=LEFT$(CF$,LEN(CF$)-1)               PO
•995 IF LEN(CF$)>16 THEN PRINT TAB(9)"[RV
 SON]DISK NAME TOO LONG":SLEEP 3:GOTO 930 KM
•1000 SCNCLR:PRINT "ENTER 2 CHARACTERS FO
 R DISK ID?";                                CP
```

```
·1005 ID$="":GETKEY ID$:IF ID$=CHR$(20) O
R ID$=CHR$(13)THEN 1000:ELSE PRINT ID$;   MD
·1010 AD$="":GETKEY AD$:IF AD$=CHR$(20) T
HEN PRINT AD$;:GOTO 1005:ELSE ID$=ID$+AD
$:PRINT AD$;                              LD
·1015 IF AD$=CHR$(13)THEN AD$=" ":ID$=LEF
T$(ID$,1):ID$=ID$+AD$:GOTO 1030           KG
·1020 GETKEY RT$:IF RT$=CHR$(20) THEN PRI
NT RT$;:ID$=LEFT$(ID$,1):GOTO 1010        JK
·1025 IF RT$<>CHR$(13) THENPRINT:PRINT TA
B(10)"[RVSON]2 CHARACTERS ONLY":SLEEP3:G
OTO 1000                                  HK
·1030 PRINTCHR$(147):PRINT "FORMATTING DI
SK: ";:PRINT CF$;:PRINT ",";:PRINT ID$    NC
·1035 PRINTTAB(10)"CONTINUE (Y/N)";       MM
·1040 GETKEY YN$                          HJ
·1045 IF YN$<>"Y"THEN EC$="START":GOTO 31
0                                         KA
·1050 IQ$=","+ID$                         GC
·1055 HEADER ""+CF$+IQ$                   CC
·1060 DK=DS:DK$=DS$:IF DK<>0 THEN EC$="E0
"                                         JA
·1065 GOTO 310                            EN
·1070 PRINTCHR$(27)+"M";                  LN
·1075 FOR X=1 TO 114:PRINT"[RED][RVSON] "
;:NEXT X                                  MG
·1080 RETURN                              MK
·1085 WINDOW X3,16,X4,18,1                PK
·1090 PRINT CHR$(147)                     II
·1095 PRINT "ENTER FILE TO RENAME?";      PF
·1100 GOSUB 1540                          KP
·1105 IF EC$="S0"THEN 1090                GG
·1110 F1$=GP$                             GP
·1115 PRINT CHR$(147)                     KH
·1120 PRINT "ENTER NEW NAME FOR FILE?";   GI
·1125 GOSUB 1540                          MM
·1130 IF EC$="S0"THEN 1115                IH
·1135 F2$=GP$                             IH
·1140 SCNCLR                              GA
·1145 PRINT "RENAME ";:PRINTF1$;:PRINT "
TO ";:PRINTF2$                            OB
·1150 PRINT TAB(8)"OK TO CONTINUE (Y/N)?"
;                                         OD
·1155 GETKEY YN$                          OI
·1160 IF YN$ <> "Y" THEN EC$="START":GOTO
 310                                      GH
·1165 RENAME ""+F1$ TO ""+F2$             CB
·1170 KS=DS:KS$=DS$:IF DS<>0 THEN EC$="E0
"                                         KC
·1175 GOTO 315                            MC
·1180 WINDOW X3,16,X4,18,1                ID
·1185 PRINT "SAVING 128 STARTUP PROGRAM"  JC
·1190 DSAVE "@128 STARTUP"                AA
·1195 DK=DS:DK$=DS$:IF DS<>0 THEN EC$="E0
"                                         CD
·1200 GOTO 315                            MN
·1205 WINDOW X3,16,X4,18,1                JC
·1210 PRINT"THIS PROCESS CREATES AN AUTOB
OOT"                                      OC
·1215 PRINT"FOR ML AND BASIC PROGRAMS. AL
L DATA"                                   BH
·1220 PRINT"ON TRACK 1 SECTOR 0 WILL BE [
RED]LOST[GREEN]!";:SLEEP7                 NI
·1225 PRINT"[CLEAR][RVSON]CONTINUE?[RVSOF
F] [c 7]Y[GREEN]/[RED]N[GREEN]":GETKEYA$ DN
·1230 IFA$<>"Y"THEN315                    BC
·1235 OPEN15,8,15,"I0":OPEN8,8,8,"#"      FE
·1240 PRINT"[CLEAR][c 7]ENTER NAME OF THE
 PROGRAM: ";:INPUT"[LEFT][LEFT]";PG$      JC
·1245 IFLEN(PG$)>16THENPRINT"[CLEAR][RED]
FILE NAME TOO LONG!":SLEEP2:GOTO1240      FN
·1250 PRINT"[CLEAR][c 7]ENTER THE PROGRAM
 TYPE: [c 6]BASIC [c 7]OR [YELLOW]ML[GRE
EN]":GOSUB1540                            HJ
·1255 BM$=GP$:IFBM$="ML"THENT$="BOOT":ELS
ET$="RUN"                                 DN
·1260 IF BM$<>"BASIC"ANDBM$<>"ML"THENPRIN
T"[CLEAR]INCORRECT ENTRY, REENTER.":SLEE
P2:GOTO1250                               GJ
·1265 C=LEN(PG$)+2831:D=CAND255:E=C/256   FB
·1270 PRINT#15,"B-P 8 0"                  NB
·1275 PRINT#8,"CBM";CHR$(0);CHR$(0);CHR$(
0);CHR$(0);PG$;CHR$(0);CHR$(0);           FP
·1280 PRINT#8,CHR$(162);CHR$(D);CHR$(160)
;CHR$(E);                                 OJ
·1285 PRINT#8,CHR$(76);CHR$(165);CHR$(175
);T$;CHR$(34);PG$;CHR$(0)                 LB
·1290 PRINT#15,"U2:8 0 1 0":DCLOSE        LJ
·1295 KS=DS:KS$=DS$:IFKS<>0THENEC$="E0"   HH
·1300 GOTO315                             DE
·1305 WINDOW X3,16,X4,18,1                BB
·1310 PRINT "THIS PROCESS PROTECTS THE BO
OT BLOCK"                                 KI
·1315 PRINT "BY CREATING A USR FILE CALLE
D [RVSON]PROTECT[RVSOFF]"                 JO
·1320 PRINT "AND ALLOCATING THE BOOT SECT
OR TO IT";                                PC
·1325 SLEEP 9                             HH
·1330 PRINT "[CLEAR][RVSON]IT SHOULD [RED
]ONLY[BLUE] BE USED AFTER HAVING"         MH
·1335 PRINT "[RVSON]FORMATTED A NEW DISK
AND MADE IT[RVSOFF]"                      EO
·1340 PRINT "[RVSON]BOOTABLE, BEFORE ADDI
NG [RED]ANY[BLUE] FILES[RVSOFF]";         MN
·1345 SLEEP 10                            LF
·1350 PRINT "[CLEAR]INSERT AUTOBOOT DISK
TO BE PROTECTED"                          NH
·1355 GOSUB 1595                          LL
·1360 GOSUB 1615:DCLEAR:EC$="START"       EL
·1365 GOTO 315                            IH
·1370 WINDOW X3,16,X4,18,1                GI
·1375 PRINT CHR$(147)                     KO
·1380 PRINT "ENTER FILE TO COPY?";        JB
·1385 GOSUB 1540                          MN
·1390 IF EC$="S0"THEN 1375                KM
·1395 F1$=GP$                             HN
```

**IMPORTANT!** Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 83 and 84 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
•1400 PRINT CHR$(147)                             MN
•1405 PRINT "ENTER NAME TO COPY TO?";             NB
•1410 GOSUB 1540                                  NC
•1415 SCNCLR                                      HE
•1420 F2$=GP$                                     JF
•1425 PRINT "COPY ";:PRINTF1$;:PRINT " TO
 ";:PRINTF2$                                      EM
•1430 PRINT TAB(8)"OK TO CONTINUE (Y/N)?"
 ;                                                GO
•1435 GETKEY YN$                                  AF
•1440 IF YN$ <> "Y" THEN EC$="START":GOTO
 310                                              HE
•1445 COPY ""+F1$ TO ""+F2$                       FL
•1450 KS=DS:KS$=DS$:IF DS<>0 THEN EC$="E0
"                                                 CD
•1455 GOTO 315                                    MN
•1460 WINDOW X3,16,X4,18,1                        JC
•1465 PRINT CHR$(147)                             AA
•1470 PRINT "THIS PROCESS SAVES THE START
UP"                                               BF
•1475 PRINT "PROG IN BANK1 SO OTHER BASIC
 PROGRAMS"                                        FH
•1480 PRINT " CAN BE RUN. F1 KEY WILL RES
TORE";                                            AO
•1485 SLEEP 6                                     BC
•1490 KEY 1,"SYS3147"                             FC
•1495 SYS 3072                                    EI
•1500 IFPEEK(215)=0THEN1505:ELSEGOTO1515          LD
•1505 X1=0:X2=39:X3=1:X4=38:X5=5:X6=33            CN
•1510 GOTO315                                     BC
•1515 X1=20:X2=59:X3=21:X4=58:X5=25:GOTO
 315                                              OG
•1520 WINDOW X3,16,X4,18,1                        OO
•1525 PRINT"NO RETURN FROM THIS FUNCTION"         LB
•1530 PRINT "CONTINUE (Y/N)";:GETKEY YN$          FJ
•1535 EC$="START":RETURN                          BK
•1540 GP$="":T1$="":TP$=""                        GH
•1545 GETKEY T1$:IF T1$=CHR$(13) OR T1$=C
HR$(20) THEN 1545                                 DK
•1550 PRINT T1$;:GP$=T1$                          NF
•1555 DO UNTIL TP$=CHR$(13)                       OB
•1560 :GETKEY TP$:PRINT TP$;                      IB
•1565 :IF TP$=CHR$(20)ANDLEN(GP$)>0 THEN
GP$=LEFT$(GP$,LEN(GP$)-1):ELSE GP$=GP$+T
P$                                                IB
•1570 IF LEN(GP$)=0 THEN 1540                     ML
•1575 LOOP                                        BJ
•1580 GP$=LEFT$(GP$,LEN(GP$)-1)                   CP
•1585 IF LEN(GP$)>16 THEN PRINT TAB(9)"[R
VSON]FILE NAME TOO LONG":SLEEP 3:EC$="S0
"                                                 CE
•1590 RETURN                                      MK
•1595 PRINT "[HOME][DOWN][5" "][RVSON]PRE
SS ANY KEY TO CONTINUE[RVSOFF]"                   KC
•1600 PRINT "[HOME][DOWN][5" "]PRESS ANY
KEY TO CONTINUE"                                  LK
•1605 GET R$:IF R$="" THEN 1595                   PH
•1610 RETURN                                      NO
•1615 GOSUB1655:PRINT#15,"B-P";8;2:GET#8,
Q$:U=ASC(Q$)                                      NG
•1620 IFU>128ANDU<133THENPRINT"ERROR - NO
T NEWLY FORMATTED DISK":PRINT "ENTRY 1 U
SED":SLEEP 5:RETURN                               LN
•1625 DCLOSE:DSAVE"PROTECT":GOSUB1655             JF
•1630 X=2:V=131:GOSUB1660:X=3:V=1:GOSUB16
60:X=4:V=0:GOSUB1660                              GM
•1635 X=30:V=1:GOSUB1660:X=31:V=0:GOSUB16
60                                                LD
•1640 PRINT#15,"U2:8 0 18 1"                      MJ
•1645 PRINT"[CLEAR]DONE":COLLECT:PRINT "C
LEANING UP[3"."]"                                 OG
•1650 DCLOSE:RETURN                               FA
•1655 OPEN15,8,15,"I0":IFDSTHENPRINTDS$:G
OTO1650:ELSEOPEN8,8,8,"#":PRINT#15,"U1:8
 0 18 1":RETURN                                   BP
•1660 PRINT#15,"B-P";8;X:PRINT#8,CHR$(V);
:RETURN                                           JJ
```

# MOONDOG
## FROM PAGE 30

FROM PAGE 30

```
•10 REM    MOONDOG-BY JC HILTY-8/86               NM
•15 POKE53280,0:POKE53281,0:PRINT"[CLEAR]
"TAB(17)"[DOWN][DOWN][GREEN]MOONDOG"              BD
•20 PRINT"[8"[DOWN]"]"TAB(7)"PLEASE WAIT[
4"."]READING DATA"                                LE
•25 GOSUB325                                      EH
•30 GOSUB425                                      EP
•35 POKEV+21,255                                  AD
•40 GOSUB310:GOSUB180:GOSUB215                    PG
•45 W1=PEEK(V+30):W2=PEEK(V+31)                   EJ
•50 LP=LP+1:IFLP=100THENPOKE2044,194:GOTO
 150                                              NK
•55 IFLP=85THENPOKE2044,193                       EL
•60 SYS(J):IFST=0THEN80                           OM
•65 IFPEEK(3)=4THENPOKE50443,255:POKE5068
8,32                                              KM
•70 IFPEEK(3)=8THENPOKE50443,1:POKE50688,
32                                                EL
•75 FB=-((PEEK(56320)AND16)=0):IFFB=1THEN
120                                               LE
•80 W1=PEEK(V+30):IFW1AND32THEN150                OG
•85 IFPEEK(V+9)<UPTHENPOKE50442,1:POKE506
88,16                                             IN
•90 IFPEEK(V+9)>DOTHENPOKE50442,255:POKE5
0688,16                                           HI
•95 IFPEEK(V+8)>EATHENPOKE50441,255:POKE5
0688,16                                           KM
•100 IFPEEK(V+8)<WETHENPOKE50441,1:POKE50
688,16                                            FD
•105 SYSC                                         EA
•110 GOTO50                                       FN
```

```
·115 REM    FIRE LASER                          LB
·120 TB=INT(PEEK(V+10)/8.3):PRINT"[HOME][
 17"[DOWN]"]"TAB(TB);F$                      OA
·125 W2=PEEK(V+31):IFW2AND16THEN135          LP
·130 PRINT"[HOME][17"[DOWN]"]"TAB(TB);A$:
 GOTO80                                      JB
·135 POKE50432,0:PRINT"[HOME][17"[DOWN]"]
 "TAB(TB);A$:POKE2044,198                    ED
·140 SC=SC+100-LP:PRINT"[HOME][DOWN][CYAN
 ]"TAB(8);SC:GOSUB180:W2=PEEK(V+31):POKE5
 0432,63:GOTO80                              AF
·145 REM    MOONDOG HIT                      CD
·150 POKE50432,0:FORX=0TO24:POKES+X,0:NEX
 T:POKES+24,15:POKES+5,8:POKES+6,255         EF
·155 POKES+4,85:F1=100:F2=230:FORQ=1TO80:
 POKES,F1:POKE2045,198:POKES+15,F2           FD
·160 POKE2045,196:F2=F2-2:F1=F1*.99:NEXT:
 POKES+6,15                                  MD
·165 SH=SH-1:PRINT"[HOME][DOWN][CYAN]"TAB
 (34);SH:IFSH=0THEN240                       MA
·170 GOTO40                                  JI
·175 REM    INITIALIZE ALIEN CRAFT           AB
·180 D=INT(2*RND(5)):IFD=0THENPOKE50441,1
 :GOTO190                                    DC
·185 POKE50441,255                           CE
·190 D=INT(2*RND(5)):IFD=0THENPOKE50442,1
 :GOTO200                                    JL
·195 POKE50442,255                           CJ
·200 UP=INT(65*RND(5)+70):DO=INT(65*RND(6
 )+106)                                      MD
·205 EA=INT(84*RND(4)+148):WE=INT(84*RND(
 6)+64):POKE50688,16                         AM
·210 POKEV+8,140:POKEV+9,120:POKE2044,192
 :LP=0:RETURN                                PO
·215 POKEV,30:POKEV+1,30:POKEV+2,80          HH
·220 POKEV+3,30:POKEV+4,170:POKEV+5,30:PO
 KEV+6,160:POKEV+7,30:POKEV+10,160           KA
·225 POKEV+11,198:POKE50443,0:POKE50688,3
 2:POKE50432,63                              EC
·230 RETURN                                  HE
·235 REM    GAME OVER                        NI
·240 POKE50432,15:PRINT"[HOME][8"[DOWN]"]
 [CYAN]"TAB(11)"G A M E  O V E R":IFSC>HS
 THENHS=SC                                   AP
·245 PRINT:PRINTTAB(11)"SCORE ";SC:PRINT:
 PRINTTAB(11)"HIGH SCORE ";HS:PRINT          BM
·250 FORX=0TO24:POKES+X,0:NEXT:POKES+24,1
 5                                           ON
·255 A=15:Q=107:POKES+5,A:POKES+12,A:POKE
 S+19,A:POKES+6,Q:POKES+13,Q                 FL
·260 POKES+20,Q:POKES+14,30:POKES+15,60:P
 OKES+4,33:POKES+11,23                       PN
·265 POKES+18,23:FORF1=40TO80STEP1:POKES+
 1,F1                                        FJ
·270 FORF2=60TO31STEP-5:POKES+8,F2:NEXTF2
 :NEXTF1                                     NN
·275 POKES+4,32:POKES+11,32:POKES+18,32:F
 ORT=0TO2000:NEXT                            DB
·280 PRINTTAB(11)"PLAY AGAIN--Y OR N"        LM
·285 GETJK$:IFJK$<>""THEN285                 LO
·290 GETP$:IFP$=""THENSYSC:GOTO290           DN
·295 IFP$="Y"THEN305                         MC
·300 END                                     KN
·305 POKE50432,0:SC=0:SH=4:GOSUB425:GOTO4
 0                                           IC
·310 FORX=0TO24:POKES+X,0:NEXT:POKES+24,1
 5:POKES+12,160:POKES+13,252                 MH
·315 POKES+8,80:POKES+7,40:POKES+11,129      KF
·320 RETURN                                  MP
·325 FORX=49152TO49528:READA:POKEX,A:NEXT    AD
·330 FORX=50880TO51116:READA:POKEX,A:NEXT    NM
·335 FORX=828TO848:READA:POKEX,A:NEXT        OI
·340 FORX=12288TO12734:READA:POKEX,A:NEXT    BP
·345 POKE50432,0:SYS51104                    PP
·350 POKE50433,254:POKE50434,1:POKE50435,
 0:POKE50436,1:POKE50437,2:POKE50438,1       HN
·355 POKE50439,0:POKE50440,2:POKE50441,0:
 POKE50442,0:POKE50443,0:POKE50444,0         EK
·360 POKE50688,63                            JC
·365 F$="[YELLOW][c J][LEFT][UP][c J][LEF
 T][UP][c J][LEFT][UP][c J][LEFT][UP][c J
 ][LEFT][UP][c J][LEFT][UP][c J][LEFT][UP
 ][c J][LEFT][UP][c J][LEFT][UP][c J][LEF
 T][UP][c J][LEFT][UP][c J][LEFT][UP][c J
 ][LEFT][UP][c J][LEFT][UP]"                 MP
·370 A$=" [LEFT][UP] [LEFT][UP] [LEFT][UP
 ] [LEFT][UP] [LEFT][UP] [LEFT][UP] [LEFT
 ][UP] [LEFT][UP] [LEFT][UP] [LEFT][UP] [
 LEFT][UP] [LEFT][UP] [LEFT][UP] "           DE
·375 V=53248:S=54272:LP=0:HS=0:SC=0:SH=4:
 C=49152:J=828                               JP
·380 FORX=2040TO2043:POKEX,197:NEXT:POKE2
 044,192:POKE2045,196:POKE2046,195           AJ
·385 POKE2047,195:FORX=39TO42:POKEV+X,15:
 NEXT                                        FM
·390 POKEV+43,8:POKEV+44,14:POKEV+45,8:PO
 KEV+46,8:POKEV+28,240:POKEV+29,240          FO
·395 POKEV+37,7:POKEV+38,0:POKEV,40:POKEV
 +1,30:POKEV+2,80:POKEV+16,128               CJ
·400 POKEV+3,30:POKEV+4,140:POKEV+5,30:PO
 KEV+6,160:POKEV+7,30:POKEV+8,140            BI
·405 POKEV+9,120:POKEV+10,160:POKEV+11,19
 8:POKEV+12,30:POKEV+13,198                  AA
·410 POKEV+14,24:POKEV+15,198                DE
·415 RETURN                                  CO
·420 REM    PLAYING SCREEN                   PI
·425 PRINT"[CLEAR][RVSON][PURPLE]M[GREEN]
   MOONDOG  MOONDOG  MOONDOG  MOONDOG [PU
 RPLE]M"                                     DP
·430 PRINT"[RVSON]O[RVSOFF]  [CYAN]SCORE"
 ;SC;TAB(17)"[RVSON]MOONDOG[RVSOFF][5" "]
 SHIPS";SH;TAB(38)"[RVSON][PURPLE]O"         IA
·435 PRINT"[RVSON]O"TAB(38)"O":PRINT"[RVS
 ON]N"TAB(38)"N":PRINT"[RVSON]D"TAB(38)"D
 "                                           OA
·440 PRINT"[RVSON]O"TAB(38)"O":PRINT"[RVS
```

```
ON]G"TAB(38)"G":PRINT"[RVSON] "TAB(38)"
"                                          FN
•445 PRINT"[RVSON]M"TAB(38)"M":PRINT"[RVS
ON]O"TAB(38)"O":PRINT"[RVSON]O"TAB(38)"O
"                                          OI
•450 PRINT"[RVSON]N"TAB(38)"N":PRINT"[RVS
ON]D"TAB(38)"D":PRINT"[RVSON]O"TAB(38)"O
"                                          KP
•455 PRINT"[RVSON]G"TAB(38)"G":PRINT"[RVS
ON] "TAB(38)" ":PRINT"[RVSON]M"TAB(38)"M
"                                          JK
•460 PRINT"[RVSON]O"TAB(38)"O":PRINT"[RVS
ON]O"TAB(38)"O":PRINT"[RVSON]N"TAB(38)"N
"                                          FJ
•465 PRINT"[RVSON][PURPLE][39" "]"         NE
•470 PRINT"[RVSON][GREEN][39" "]"          FB
•475 PRINT"[RVSON][BLUE][39" "]"           CP
•480 PRINT"[RVSON][RED][39" "]"            DJ
•485 RETURN                                HE
•490 REM SCROLL DATA                       HK
•495 DATA 174,114,193,224,3,144,3,76,117,
192,188,114,193,140,121,193,174            DC
•500 DATA 118,193,232,202,32,30,193,172,1
21,193,173,119,193,201,2,208,10            BG
•505 DATA 169,32,72,173,33,208,72,76,50,1
92,177,90,72,177,92,72,204                 ON
•510 DATA 116,193,240,20,200,177,90,72,17
7,92,136,145,92,104,145,90,200             KH
•515 DATA 204,116,193,208,238,240,18,136,
177,90,72,177,92,200,145,92,104            CN
•520 DATA 145,90,136,204,115,193,208,238,
173,119,193,201,0,208,5,104,104            AH
•525 DATA 76,111,192,104,145,92,104,145,9
0,236,117,193,208,160,96,172,116           MA
•530 DATA 193,200,189,114,193,170,32,30,1
93,173,120,193,201,2,208,19,136            PP
•535 DATA 169,32,153,122,193,173,33,208,1
53,162,193,204,115,193,208,239,240         KG
•540 DATA 16,136,177,90,153,122,193,177,9
2,153,162,193,204,115,193,208,240          NK
•545 DATA 236,117,193,240,37,202,32,30,19
3,172,116,193,200,136,177,90,72            ML
•550 DATA 177,92,32,48,193,145,92,104,145
,90,32,56,193,204,115,193,208              NH
•555 DATA 234,236,117,193,208,221,240,46,
202,206,118,193,232,32,30,193,172          HC
•560 DATA 116,193,200,136,32,48,193,177,9
0,72,177,92,32,56,193,145,92               LO
•565 DATA 104,145,90,204,115,193,208,234,
236,118,193,208,221,238,118,193,232        MC
•570 DATA 32,30,193,173,120,193,201,0,240
,20,172,115,193,136,200,185,162            OO
•575 DATA 193,145,92,185,122,193,145,90,2
04,116,193,208,240,96,189,89,193           BG
•580 DATA 133,91,24,105,212,133,93,189,64
,193,133,90,133,92,96,72,152               CG
•585 DATA 24,105,40,168,104,96,72,152,56,
233,40,168,104,96,0,40,80                  OK
•590 DATA 120,160,200,240,24,64,104,144,1
84,224,8,48,88,128,168,208,248             HI
•595 DATA 32,72,112,152,192,4,4,4,4,4,4,4
,5,5,5,5,5                                 BB
•600 DATA 5,6,6,6,6,6,6,6,7,7,7,7,7,4,0,3
8,20,23,1,1                                AO
•605 REM    SPRITE MOVEMENT DATA           FD
•610 DATA 169,255,45,0,198,240,16,169,0,1
41,0,198,162,21,189,0                      AD
•615 DATA 197,157,0,198,202,208,247,162,1
,169,1,141,80,197,173,80                   NH
•620 DATA 197,45,0,197,240,3,76,243,198,2
32,232,14,80,197,208,238,76,49,234         HL
•625 DATA 169,0,29,0,197,208,3,76,97,199,
169,128,61                                 MB
•630 DATA 0,197,240,48,254,0,198,208,40,2
22,255,207,76,144,199,80                   GM
•635 DATA 197,45,16,208,208,12,173,16,208
,13,80,197,141,16,208,76                   IG
•640 DATA 43,199,173,16,208,77,80,197,141
,16,208,189,0,197,157,0                    GO
•645 DATA 198,76,97,199,222,0,198,208,40,
254,255,207,208,29,173,80                  PI
•650 DATA 197,45,16,208,208,12,173,16,208
,13,80,197,141,16,208,76                   FH
•655 DATA 91,199,173,16,208,77,80,197,141
,16,208,189,0,197,157,0                    MK
•660 DATA 198,169,0,232,29,0,197,208,3,76
,140,199,169,128,61,0                      NC
•665 DATA 197,240,11,254,0,198,208,20,222
,255,207,76,134,199,222,0                  NP
•670 DATA 198,208,9,254,255,207,189,0,197
,157,0,198,202,76,233,198                  NJ
•675 DATA 169,255,221,255,207,240,3,76,43
,199,173,80,197,76,17,199                  MO
•680 DATA 120,169,192,141,20,3,169,198,14
1,21,3,88,96                               IF
•685 REM    JOYSTICK DATA                  LI
•690 DATA 173,0,220,41,31,73,31,133,3,173
,1,220,73,255,133,2,5,3,133,144,96         DN
•695 REM    SPRITE DATA                    CE
•700 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,32,0,0,152,0,0,32,0,0,0,0     IN
•705 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0               PM
•710 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,16,0,0,168,0            KG
•715 DATA 2,170,0,10,154,128,2,170,0,0,16
8,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0            FN
•720 DATA 0,0,0,0,0,0,0                    LP
•725 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,20,0,0,170,0,2,170,128,9,150,96           JG
•730 DATA 170,170,170,10,85,160,2,170,128
,0,170,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0       OP
•735 DATA 0,0,0,0,0,0,0,0,0,0              PJ
•740 DATA 0,0,0,0,20,0,0,170,0,2,170,128,
9,150,96,170,170,170,10,85,160             FL
•745 DATA 2,170,128,0,170,0,0,0,0,0,0,0,0
```

**IMPORTANT!** Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 83 and 84 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
,0,0,0,0,0,0,0,0,0,255,0,3,255,192        KM
•750 DATA 15,255,240,255,255,255,15,255,2
40,3,255,192,0,255,0,0                    DM
•755 DATA 0,130,0,0,130,0,2,170,128,0,255
,0,128,215,2,170,215,170,128,215,2        NN
•760 DATA 0,255,0,0,40,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,195,0,3,255,192           KK
•765 DATA 0,60,0,192,255,3,255,255,255,19
2,255,3,0,60,0,0                          EB
•770 DATA 0,0,0,0,0,0,0,0,0,0,124,0,0,254
,0,1,255,0,3,207,128,7,156,192            EF
•775 DATA 15,60,224,14,127,224,14,60,224,
15,14,224,15,188,224,7,255,192            OA
•780 DATA 3,231,128,1,231,0,0,254,0,0,124
,0,0,0,0,0,0,0,0,0,0,0                    FF
•785 DATA 0,0,0,76,1,0,0,128,4,32,4,32,0,
48,0,8,0,0,0,32,48,80,0,130,3,12,0        AJ
•790 DATA 0,0,4,32,0,128,0,36,0,0,0,192,2
01,0,4,0,0,0,19,32,192,0,4,0,32,0,1       JI
•795 DATA 4,192,0,0,4,8,0,0,0             AK
```

# ILLUSION MASTER

## FROM PAGE 36

FROM PAGE 36

```
•10 PRINT"[CLEAR][BLACK]":POKE53281,1     CJ
•15 PRINT:PRINT:PRINT:PRINT:PRINT         PG
•20 PRINT"[3" "][RVSON][3" "][RVSOFF] [RV
SON] [RVSOFF][3" "][RVSON] [RVSOFF][3" "
][RVSON] [RVSOFF] [RVSON] [RVSOFF] [RVSO
N][3" "][RVSOFF] [RVSON][3" "][RVSOFF] [
RVSON][3" "][RVSOFF] [RVSON] [RVSOFF][3"
"][RVSON] [RVSOFF]"                       MG
•25 PRINT"[4" "][RVSON] [RVSOFF]  [RVSON]
 [RVSOFF][3" "][RVSON] [RVSOFF][3" "][RV
SON] [RVSOFF] [RVSON] [RVSOFF] [RVSON] [
RVSOFF][4" "][RVSON] [RVSOFF]  [RVSON] [
RVSOFF] [RVSON] [RVSOFF] [RVSON]  [RVSOF
F]  [RVSON] [RVSOFF]"                     KM
•30 PRINT"[4" "][RVSON] [RVSOFF]  [RVSON]
 [RVSOFF][3" "][RVSON] [RVSOFF][3" "][RV
SON] [RVSOFF] [RVSON] [RVSOFF] [RVSON][3
" "][RVSOFF]  [RVSON] [RVSOFF]  [RVSON]
[RVSOFF] [RVSON] [RVSOFF] [RVSON] [RVSOF
F] [RVSON] [RVSOFF] [RVSON] [RVSOFF]"     MM
•35 PRINT"[4" "][RVSON] [RVSOFF]  [RVSON]
 [RVSOFF][3" "][RVSON] [RVSOFF][3" "][RV
SON] [RVSOFF] [RVSON] [RVSOFF][3" "][RVS
ON] [RVSOFF]  [RVSON] [RVSOFF]  [RVSON]
[RVSOFF] [RVSON] [RVSOFF] [RVSON] [RVSOF
F]  [RVSON]  [RVSOFF]"                    DO
•40 PRINT"[3" "][RVSON][3" "][RVSOFF] [RV
SON][3" "][RVSOFF] [RVSON][3" "][RVSOFF]
 [RVSON][3" "][RVSOFF] [RVSON][3" "][RVS
OFF] [RVSON][3" "][RVSOFF] [RVSON][3" "]
[RVSOFF] [RVSON] [RVSOFF][3" "][RVSON] [
RVSOFF]"                                  IH
•45 PRINT"                                OO
•50 PRINT"[7" "][RVSON]  [RVSOFF] [RVSON]
  [RVSOFF]  [RVSON] [RVSOFF]  [RVSON][3"
 "][RVSOFF] [RVSON][3" "][RVSOFF] [RVSON
][3" "][RVSOFF] [RVSON]  [RVSOFF]"        AC
•55 PRINT"[7" "][RVSON] [RVSOFF] [RVSON]
[RVSOFF] [RVSON] [RVSOFF] [RVSON] [RVSOF
F] [RVSON] [RVSOFF] [RVSON] [RVSOFF][4"
"][RVSON] [RVSOFF]  [RVSON] [RVSOFF][3"
"][RVSON] [RVSOFF] [RVSON] [RVSOFF]"      AD
•60 PRINT"[7" "][RVSON] [RVSOFF] [RVSON]
[RVSOFF] [RVSON] [RVSOFF] [RVSON][3" "][
RVSOFF] [RVSON][3" "][RVSOFF]  [RVSON] [
RVSOFF]  [RVSON][3" "][RVSOFF] [RVSON]
[RVSOFF]"                                 MP
•65 PRINT"[7" "][RVSON] [RVSOFF][3" "][RV
SON] [RVSOFF] [RVSON] [RVSOFF] [RVSON] [
RVSOFF][3" "][RVSON] [RVSOFF]  [RVSON] [
RVSOFF]  [RVSON] [RVSOFF][3" "][RVSON] [
RVSOFF] [RVSON] [RVSOFF]"                 GE
•70 PRINT"[7" "][RVSON] [RVSOFF][3" "][RV
SON] [RVSOFF] [RVSON] [RVSOFF] [RVSON] [
RVSOFF] [RVSON][3" "][RVSOFF]  [RVSON] [
RVSOFF]  [RVSON][3" "][RVSOFF] [RVSON] [
RVSOFF] [RVSON] [RVSOFF]"                 KF
•75 PRINT:PRINT:PRINT:PRINT:PRINT:PRINT   BA
•80 PRINT"[RED]  PRESS ANY KEY"           CC
•85 FORX=49152TO49163                     GA
•90 READA:POKEX,A                         LJ
•95 NEXTX                                 DN
•100 DATA136,140,32,208,173,197,0,201,64,
240,245,96                                KH
•105 SYS49152                             BO
•110 GETD$                                HI
•115 POKE53281,0:POKE53280,2:PRINT"[CLEAR
][YELLOW]":POKE53272,23                   EF
•120 PRINT"[DOWN][s I][s L][s L][s U][s S
][s I][s O][s N][SS][s M][s A][s S][s T]
[s E][s R] ALLOWS YOU TO MAKE DISK"       LJ
•125 PRINT"DIRECTORIES AND DISK FILES VAN
ISH AND"                                  HP
•130 PRINT"REAPPEAR AT WILL.":PRINT       MJ
•135 PRINT"[s A] DISK WITH AN INVISIBLE D
IRECTORY CAN"                             FL
•140 PRINT"HAVE FILES [s S][s A][s V][s E
]D TO IT AND [s L][s O][s A][s D]ED FROM
"                                         IH
•145 PRINT"IT AS NORMAL.":PRINT           KL
•150 PRINT"[s I]NVISIBLE FILES REMAIN ON
THE DISK BUT"                             OL
•155 PRINT"WILL BE OVERWRITTEN BY SUBSEQU
ENT [s S][s A][s V][s E]S"                PG
•160 PRINT"TO THE DISK. [s I]NVISIBLE FIL
ES WILL NOT"                              PC
•165 PRINT"[s L][s O][s A][s D] HOWEVER,
SO THIS CAN BE USED AS A"                 JB
```

```
·170 PRINT"FORM OF SECURITY SINCE YOU MUS
 T KNOW"                                    NG
·175 PRINT"THE FILE NAME TO CAUSE IT TO R
 EAPPEAR.":PRINT                            IG
·180 PRINT"[s N][s O][s T][s E]: [s D]IRE
 CTORY READING PROGRAMS SUCH AS"            CJ
·185 PRINT"[UP]THE [s D][s O][s S] WEDGE
 '>$' COMMAND WILL DISPLAY"                 BM
·190 PRINT"INVISIBLE DIRECTORIES BUT NOT
 INVISIBLE"                                 IG
·195 PRINT"FILES.":PRINT:PRINT:PRINT        LN
·200 PRINT"[RED][12" "][RVSON] [s P][s R]
 [s E][s S][s S][SS][s A][s N][s Y][SS][s
  K][s E][s Y][SS][UP]"                     GG
·205 GETD$:IFD$=""THEN205                   CB
·210 POKE53272,21                           AH
·215 PRINT"[CLEAR][BLACK]":POKE53281,1:PO
 KE53280,2                                  GG
·220 PRINT"[10" "][RVSON][17" "]"           CI
·225 PRINT"[10" "][RVSON] ILLUSION MASTER
 "                                          HM
·230 PRINT"[10" "][RVSON][17" "]"           DK
·235 PRINT"[BLUE][DOWN][DOWN] 1 - CAUSE A
  DISK DIRECTORY TO VANISH                  KD
·240 PRINT"[DOWN] 2 - CAUSE A FILE TO VAN
 ISH                                        DP
·245 PRINT"[DOWN] 3 - RESTORE AN INVISIBL
 E DIRECTORY                                DI
·250 PRINT"[DOWN] 4 - RESTORE AN INVISIBL
 E FILE                                     DD
·255 PRINT"[DOWN] 5 - EXIT ILLUSION MASTE
 R                                          JL
·260 PRINT"[8"[DOWN]"][RIGHT][RED]CHOICE
 ?"                                         LF
·265 GETI$:IFI$=""THEN265                   LO
·270 IFI$<"1"ORI$>"5"THEN265                LO
·275 I=VAL(I$)                              IL
·280 ONIGOTO285,420,525,635,750             FF
·285 POKE53280,2:POKE53281,0:PRINT"[CLEAR
 ][YELLOW][DOWN][RIGHT]"                    HH
·290 PRINT"INSERT YOUR DISK (ENSURE WRITE
 -PROTECT"                                  IE
·295 PRINT"NOTCH IS UNCOVERED) AND PRESS
 ANY KEY."                                  LM
·300 GETD$:IFD$=""THEN300                   IH
·305 PRINT"[CLEAR][DOWN][RIGHT]WORKING[3"
 ."]"                                       HG
·310 OPEN15,8,15:OPEN2,8,2,"#"              GD
·315 PRINT#15,"U1:"2;0;18;0                 EC
·320 GOSUB855                               HB
·325 PRINT#15,"B-P:"2;147                   LP
·330 GET#2,X$,Y$,Z$:IFX$+Y$+Z$=""THEN410    GA
·335 PRINT#15,"B-P:"2;144                   JE
·340 B$=""                                  LB
·345 FORX=1TO7                              OF
·350 GET#2,A$                               OM
·355 B$=B$+A$                               OG
·360 NEXTX                                  EH
·365 PRINT#15,"B-P:"2;177                   AC
·370 PRINT#2,B$                             ML
·375 A$="[3"[DEL]"]"+CHR$(0)+CHR$(0)+CHR$
 (0)                                        PM
·380 PRINT#15,"B-P:"2;144                   OH
·385 PRINT#2,A$                             NJ
·390 PRINT#15,"U2:"2;0;18;0                 GG
·395 GOSUB855                               MC
·400 PRINT#15,"U;"                          IA
·405 CLOSE15:CLOSE2:GOTO835                 CO
·410 PRINT"[DOWN][RED]THE DIRECTORY IS AL
 READY INVISIBLE"                           NB
·415 CLOSE15:CLOSE2:GOTO840                 PC
·420 POKE53280,2:POKE53281,0:PRINT"[CLEAR
 ][YELLOW][DOWN][RIGHT]"                    EO
·425 PRINT"INSERT YOUR DISK (INSURE WRITE
 -PROTECT"                                  LL
·430 PRINT"NOTCH IS UNCOVERED)"             LG
·435 INPUT"[DOWN]WHAT'S THE FILE NAME ";F
 $                                          AM
·440 T=18:S=1:OPEN15,8,15:OPEN2,8,2,"#"     CI
·445 GOSUB755                               PH
·450 IFP=256THEN505                         CE
·455 PRINT#15,"B-P:"2,P                     NL
·460 GET#2,T$                               HP
·465 IFT$=""THEN515                         PL
·470 PRINT#15,"B-P:"2,P+22                  AP
·475 PRINT#2,T$;                            HD
·480 PRINT#15,"U2:"2;0;T;S                  ND
·485 GOSUB855                               BI
·490 PRINT#15,"S:"+F$                       PP
·495 GOSUB855                               BO
·500 CLOSE15:CLOSE2:GOTO835                 EH
·505 PRINT"[RED][DOWN]"F$" IS NOT ON THIS
  DISK"                                     AH
·510 CLOSE15:CLOSE2:GOTO840                 FD
·515 PRINT"[RED][DOWN]"F$" IS ALREADY INV
 ISABLE"                                    HA
·520 CLOSE15:CLOSE2:GOTO840                 GM
·525 POKE53280,2:POKE53281,0:PRINT"[CLEAR
 ][YELLOW][DOWN][RIGHT]"                    MA
·530 PRINT"INSERT YOUR DISK (INSURE WRITE
 -PROTECT"                                  LF
·535 PRINT"NOTCH IS UNCOVERED) AND PRESS
 ANY KEY."                                  GB
·540 GETD$:IFD$=""THEN540                   GO
·545 PRINT"[CLEAR][DOWN][RIGHT]WORKING[3"
 ."]"                                       GB
·550 OPEN15,8,15:OPEN2,8,2,"#"              GG
·555 PRINT#15,"U1:"2;0;18;0                 AP
·560 GOSUB855                               FM
·565 PRINT#15,"B-P:"2;147                   LC
·570 GET#2,X$,Y$,Z$:IFX$+Y$+Z$<>""THEN615   JI
·575 PRINT#15,"B-P:"2;177                   KL
·580 INPUT#2,B$                             IK
·585 PRINT#15,"B-P:"2;144                   KF
·590 PRINT#2,B$;                            PF
·595 PRINT#15,"U2:"2;0;18;0                 BM
```

```
·600 GOSUB855                                  IE
·605 PRINT#15,"U;"                             HC
·610 CLOSE15:CLOSE2:GOTO835                    OE
·615 PRINT"[CLEAR][DOWN][RIGHT]THE DIRECT
 ORY ON THIS DISK HAS NOT"                     FH
·620 PRINT" BEEN MADE INVISIBLE WITH ILLU
 SION"                                         EC
·625 PRINT" MASTER."                           FJ
·630 CLOSE15:CLOSE2:GOTO840                    AK
·635 POKE53280,2:POKE53281,0:PRINT"[CLEAR
 ][YELLOW][DOWN][RIGHT]"                       KG
·640 PRINT"INSERT YOUR DISK (ENSURE WRITE
 -PROTECT"                                     OP
·645 PRINT"NOTCH IS UNCOVERED)"                LO
·650 INPUT"[DOWN]WHAT'S THE FILE NAME ";F
 $                                             HE
·655 T=18:S=1:OPEN15,8,15:OPEN2,8,2,"#"        HA
·660 GOSUB755                                  MP
·665 IFP=256THEN730                            PM
·670 PRINT#15,"B-P:"2,P                        JD
·675 GET#2,T$                                  EH
·680 IFT$<>""THEN740                           HA
·685 PRINT#15,"B-P:"2,P+22                     OH
·690 GET#2,T$                                  DC
·695 PRINT#15,"B-P:"2,P                        MM
·700 PRINT#2,T$;                               HN
·705 PRINT#15,"U2:"2;0;T;S                     MJ
·710 GOSUB855                                  PG
·715 PRINT#15,"V"                              IK
·720 GOSUB855                                  PM
·725 CLOSE15:CLOSE2:GOTO835                    HB
·730 PRINT"[RED][DOWN]"F$" IS NOT ON THIS
 DISK"                                         OJ
·735 CLOSE15:CLOSE2:GOTO840                    EN
·740 PRINT"[RED][DOWN]"F$" IS NOT INVISIB
 LE"                                           BG
·745 CLOSE15:CLOSE2:GOTO840                    EP
·750 SYS64760                                  IB
·755 PRINT#15,"U1:"2;0;T;S                     OM
·760 GOSUB855                                  CE
·765 PRINT#15,"B-P:"2;0                        BJ
·770 GET#2,A$,B$                               CM
·775 A=VAL(A$+CHR$(0)):B=VAL(B$+CHR$(0))       OK
·780 FORX=5TO229STEP32                         BF
·785 N$=""                                     HM
·790 PRINT#15,"B-P:"2;X                        CL
·795 FORY=1TOLEN(F$)                           PJ
·800 GET#2,A$                                  KA
·805 N$=N$+A$                                  LK
·810 NEXTY                                     AC
·815 IFF$=N$THENP=X-3:RETURN                   ME
·820 NEXTX                                     BF
·825 IFA=0THENP=256:RETURN                     PL
·830 T=A:S=B:GOTO755                           EI
·835 PRINT"[CLEAR][DOWN][RIGHT]DONE."          EP
·840 PRINT"[DOWN][WHITE]PRESS ANY KEY"         KM
·845 GETD$:IFD$=""THEN845                      KG
·850 GOTO215                                   HP
·855 INPUT#15,EN,EM$,ET,ES                     GH
·860 IFEN=0THENRETURN                          JL
·865 IFEN=1THENRETURN                          JH
·870 PRINT"[DOWN][DOWN][RED][RIGHT]DISK I
 /O ERROR: "EN;EM$;ET;ES                       BD
·875 CLOSE15:CLOSE2:GOTO840                    MA
```

# SCUTTLEBUTT

*Continued from page 13*

## RS232 TO SERIAL LINK

TecTrans' 98064 Interface permits the user to interface the RS232 port of an IBM PC or other non-Commodore computer to the serial port of a Commodore. Dual 32K buffers are built in, one for sending and one for receiving data. The drawback: you'll have to provide the software to drive the interface, as none is commercially available.

TecTrans, 818-285-3121 (see address list, page 13).

## 16K DATA STORAGE

The *16K Quick Brown Box* battery-backed RAM cartridge allows C-64 and C-128 owners to store data indefinitely, even after power is turned off, and access the data immediately on power-up. Loader utilities for both computers are included, with a switch for shuttling between operating modes. Programmers can select read/write or read only, or make the cartridge invisible to other software. The internal Lithium battery will last from 7 to 10 years. Price is $59 plus $3 postage (MA residents add 5%).

Brown Boxes, Inc., 617-275-0090 (see address list, page 13).

## CP/M CATALOG

An updated catalog of public domain CP/M software at $16 per disk is available from Poseidon Electronics. The price is $2.00 plus .56 postage.

Poseidon Electronics (see address list, page 13).

## UPDATE INCLUDED

Batteries Included has announced a new product update policy, whereby registered owners can receive enhanced versions of BI programs for $10.00 each plus the return of the original disk (or free with dated receipt within 90 days of purchase). Also available is a variety of upgrade offers (e.g., adding a spelling checker to *PaperClip*), details on which can be obtained directly from BI.

Batteries Included, 416-881-9941 (see address list, page 13).

## FLOPPY DISCO

*It's Only Rock 'N Roll* ($29.95) supplies 40 new songs and 18 digitized instruments for use with *Instant Music, DeluxeVideo,* and *Deluxe Music Construction Set* on the Amiga. The selections are divided into eight categories from 1956-present: Memphis '56 (R&B), Philadelphia '59 (early beat), Detroit '62 (Motown), Chicago '65 (rock blues), San Francisco '68 (acid rock), Los Angeles '71 (heavy metal), London '74 (progressive), and New York '77 (new wave). Instruments include LesPaul and PowerChord guitars, RockSax, Bongotom, and Male/Female Chorus.

Electronic Arts, 415-571-7171 (see address list, page 13).

*Continued from page 71*

most of the pertinent information. The documentation does not explain how to determine what goes in each blank of the forms. You are expected to read the booklet the IRS provides with the tax forms.

The docs do tell you everything you need to know about running the program, from when you need to change disks to cautions covering just about every fatal error you can make. If you follow the prompts on the screen and read along in the docs, you should be safe from data loss.

The warning messages that appear on the screen are important. The program expects you to save the data from each form before you return to the main menu. When you choose the option to return to the main menu, the program does give you a last chance to change your mind before it starts loading in the main program.

### Ease of Use

I found the program to be reasonably easy to use. There are a couple of areas where it could be improved, but all in all it isn't too bad. In the depreciation form, the program does not calculate the amount of depreciation for each item that you own. Instead it expects you to have already done these calculations and you must enter the totals for each type of depreciation.

I found it annoying to be required to reenter the taxpayer name and social security number on some of the schedules, but this was only a minor inconvenience. When establishing forms, the program asks you to give each one an identification code, in addition to indicating the taxpayer's initials and an identifying number. These three pieces of information are used to uniquely code each form. This is a necessity to prevent errors.

I objected to the form of data entry, however. Each of these entries is accepted when you type the final character, rather than by typing a RETURN. If you make an error on one of the early characters, you can back up and type over it. But if you make a mistake on the last character, you must go through a lengthy process to change the mistake. Still, this is a minor inconvenience.



Filling out the 1040 was a more serious hassle. Whether you have any data to put in Schedules A or B, you must still wade through them. Whether or not you itemize your deduction, you must enter any charitable contributions on the appropriate line of Schedule A in order for them to be entered on your 1040. There is no way to bypass this and just enter the contributions on the 1040.

While the ads state that the program will transfer data between forms, I found this was only partially true. My husband and I each have our own business, so it is necessary for us to fill out two Schedule Cs. The program had no problem with allowing me to fill out two forms and save them to disk under separate identifications. However, when I went to transfer the data to my 1040, it only grasped my husband's Schedule C information. It does offer the chance to add more income manually, but this is not the ideal way to handle this information.

In relation to this, when filling out the 1040 the program offers you the opportunity to import data from the other forms you have already filled out. If you prefer you can enter the information manually. If using a dual-drive system, it is convenient to take the data from disk. In a single disk drive system, it is much quicker to enter the data manually because you avoid having to swap disks twice.

### Calculator Included

One very nice feature of *Tax Master* is a memory resident calculator that comes up instantly from anywhere in the program, inside any form. It doesn't offer any fancy graphics or programmable calculations. All the instructions you need to operate the calculator appear on the right side of the screen. Figures progress up the left side of the screen, much as the paper tape in a desktop business calculator does.

It does simple math with one memory cell available. You can use scientific notation, though this isn't particularly useful when calculating taxes. It would've been nice to have figures print out on paper, but the program doesn't do this.

The program will transfer the last calculation to the area of the form you were working on when you activated the calculator.

### Conclusion

At $30, this is an acceptable tax package. It is suitable to the needs of most people. A $10 coupon towards the purchase of next year's version is a great offer, since there will be sweeping changes in the tax forms next year. Though there are more comprehensive tax programs on the market, they also cost $20 more. For a professional who does taxes for others, one of the more expensive packages would be a better buy. For the average tax payer, *Tax Master* is probably adequate.

Master Software, 6 Hillery Court, Randallstown, MD 21133 (phone: 301-922-2962). *—Cheryl Peterson*

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